The Builder.

VOL. LXXV. No. 2899. AUGUST 27, 1898.

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Aluminium.

ALUMINIUM has now ranked among the abundant and comparatively low-priced metals of commerce for a period sufficiently lengthy to enable a fair estimate to be made of its value and industrial utility.

Some ten or twelve years ago, when aluminium was being brought prominently to the notice of the British public, many statements of a somewhat startling nature were made concerning it; some even going so far as to foretell the rapid abandonment of iron and steel in favour of the so-called new metal.

Although the prognosticated aluminium age has not yet replaced the age of iron, and the latter element still heads our list of useful metals, the steady increase in the production of aluminium during the last seven or eight years is evidence that the metal has been found of practical value in certain of the arts and industries; and it may safely be predicted that as the use of aluminium becomes more common, fresh fields in which it can with advantage be employed will be discovered, and should its price continue to decrease there is little doubt that copper and brass will frequently be replaced by aluminium.

The literature which has been published upon the subject of aluminium is very voluminous, but of that which has appeared during the present year the most interesting and instructive is to be found in a paper upon "Aluminium and other Electro-Chemical Industries at Foyers," read by Mr. Wallace before the Society of Chemical Industry. This author quotes the results and figures actually obtained at the British Aluminium Works at Foyers, in Scotland, and from these and other statistics the true position of aluminium at the present time among the commercial metals may be seen.

The following table, which shows the quantity of aluminium produced and its price per ton during the last eight years, is conclusive evidence as to its commercial utility:—

Year.	Tons per Annum.	Price per Ton. £
1890	40	1,083
1891	200	504
1892	300	308
1893	530	298
1894	1,200	186
1895	1,800	160
1896	2,000	155
1897	2,500	148

Even at the lowest figure of 148*l.* per ton aluminium appears, at first sight, to be a very expensive metal, but it is so much lighter in weight than any of the other common metals, that if its price is compared bulk for bulk, instead of weight for weight, with other metals, it is found to be cheaper than copper or tin. Thus:—

Metal.	Weight of a cubic foot. lbs.	Approximate price of a cubic foot. £	Approximate market price per ton, 1898. £
Aluminium ...	162	10½	148
Copper (cast) ...	550	13½	55
Iron „ ...	450	1	6
Zinc „ ...	450	4½	23
Lead „ ...	710	4½	14
Tin „ ...	456	15	74

It appears that the first aluminium factory was erected in a suburb of Paris as long ago as the year 1856, and that in 1859 Gerhard was selling aluminium made at Battersea at 3s. 9d. per ounce, so that even as a commercial article aluminium is by no means a "new" metal. It is, however, only during the present decade that aluminium can be said to have entered the ranks of the industrial metals, but taking into consideration the abundance in which its compounds occur in Nature, and the ever-increasing cheapness of electrical energy generated by water-power, it is evident that aluminium is likely to take a prominent position among the metals of the twentieth century.

According to Mr. Wallace, the cost of power at Foyers is, roughly speaking, about 30s. per horse-power per annum, exclusive of interest on capital; and Professor Kennedy was quoted as stating that 9*l.* was the lowest cost at which the same horse-power could be produced in Scotland (where coal costs 3s. 6d. per ton) by means of steam. Assuming these figures to be correct, the saving effected by utilising water power, instead of steam, for the generation of electrical energy, is so great that steam can no longer be considered as a rival to water power for this purpose.

Several processes have been employed for the manufacture of aluminium, but in this country all have been abandoned save the process owned and worked by the British Aluminium Company. By this process aluminium is obtained by subjecting aluminium oxide to electrolysis in a bath of molten cryolite, and as the oxide becomes reduced, more oxide passes into the bath, and thus the process is carried on continuously. It is stated that the temperature of the bath lies between 750 deg. C. and and 850 deg. C., and that a tension of from three to five volts is sufficient to maintain the necessary temperature as well as to effect electrolysis. The oxide is prepared from Irish bauxite, an impure hydrated oxide of aluminium, extensive deposits of which are found in the County of Antrim.

At present aluminium owes its popularity mainly to its being so much lighter than the other metals of commerce; for portable appliances it is especially valuable, and has already proved serviceable in the equipment of regiments, in the manufacture of cycles and carriages, and in the manufacture of appliances for travelling photographers. It should also benefit the field surveyor and his staff by materially reducing the weight of most of the surveying instruments and appliances. Although a white metal, aluminium is not, like silver, blackened by exposure to air containing sulphuretted hydrogen; nor does it corrode like brass, or rust like iron.

It is attacked readily by hydrochloric acid and alkalies; but water, moist or dry air, nitric acid, and most of the organic acids do not attack it to any appreciable extent. If, by mischance, small quantities of it are absorbed into the system owing to the aluminium having found its way, as a soluble salt, into food substances, it does not, like copper or lead, act as a poison. For surgical instruments, boiling pans, and storage vessels it has already been used with advantage, and from the results obtained by numerous experimentalists it appears probable that it will in the future play an important part in

the manufacture of steel and of various alloys.

The future of aluminium must largely depend upon its price as compared with other metals, but even at its present price it is undoubtedly a metal of great industrial importance, and although it lacks many of the most useful properties of some of its competitors, and is far from possessing all the merits that some of its too zealous patrons have claimed for it, yet it is well worthy of the careful attention and study of all who manufacture, supply, or utilise common metals for industrial purposes.

THE MODERN HISTORY OF LONDON STREET IMPROVEMENTS.

THE change in the character of a modern city is of such a piecemeal and gradual character, that the full extent of what has occurred during a series of years is somewhat difficult to realise. People forget what has been accomplished, and, looking at a city as it exists, they complain of its inconveniences and of the want of vigour in regard to improvements. We think that if a citizen of London will look at Mr. Percy Edwards' "History of London Street Improvements, 1855 to 1897,"* he will be surprised at what has been done. It is, in fact, a history, in part, of London during the last half of the present century. "It is sought," says the author in his introduction, "to give a description of the London street improvements undertaken by the Metropolitan Board of Works, from the time it was called into existence in 1855, to March, 1889, when it was superseded by the London County Council, from April, 1889, to December, 1897." Before the Metropolitan Board of Works came into existence, the state of affairs may best be described as being one of promise, but not of performance. Nor does anything better exemplify the uselessness of investigation and reports alone, than the state of London at the middle of the century. In 1830 a Select Committee made various recommendations as to new streets, and it showed conclusively the necessity for them. Again, "between 1832 and 1857 the necessity of street improvement in London was so fully recognised by Parliament that during that time some eleven or twelve Select Committees were appointed to take into consideration plans for the improvement of the Metropolis, and to advise as to the best means of carrying out improvements. . . . As a result many large improvements were brought before Parliament. . . . Very few schemes, however, were actually undertaken, principally owing to the difficulty of obtaining a convenient source of revenue from which to pay the cost of the works." It is obvious, therefore, that we must date the commencement of street improvements in London from the creation of the Metropolitan Board of Works. Before that event they were practically at a standstill. There was much talk but next to no action.

Towards the end of its existence the Metropolitan Board of Works had sadly lost the public confidence; but there can be no doubt that it has left a permanent and useful mark on the history of the Metropolis. If it had done nothing else but construct the Victoria Embankment—a thoroughfare which as years go on will be more and more appreciated—it would have deserved well of London. During the whole time that it existed, from 1857 to 1889, "there was not a time at which the Board had not in hand extensive works intended to provide new and improved means of access from one part of the town to another. Every district participated in the benefit; every locality showed by one or more new or widened thoroughfares where the hand of the Board had been at work." Nor was the task in some senses an easy one, since the powers of the Board were, so far as regards the existing Acts of Parliament, so limited that in nearly every instance where an important street improvement was to be undertaken application had to be made to Parliament for a special Act.

Improvements of any kind require money. Nothing, indeed, is more remarkable than the way in which inhabitants of a town or a local district will complain of the state of the place, and yet in the same breath will deprecate the expenditure of money on public improvements. Some persons think that the Metropolitan Board of Works might have done more than they did. Yet they spent during their existence over fifteen millions, which, by recoupment from the sale of surplus land, was reduced to ten millions. During the first part of its existence there is no doubt that the Board was hampered in a financial sense. It was not until the Loans Act, 1869, was passed that it was able to obtain large sums of money at a reasonable rate of interest. The essentials of that statute were that the cost of the improvements undertaken by the Board should be spread over a period of sixty years; that it should be raised by the creation of a stock called the Metropolitan Consolidated Stock; and that there should be one rate for all the Board's expenditure. Previous to this legislation, the Board had been obliged to borrow from insurance companies at a rate as high as 4½ per cent. Thus it is evident that what may be called systematic municipal finance, without which any extensive improvements were impossible, was growing during the period of the Board's life. "As soon as the Board was authorised, under the Act of 1869, to create a Metropolitan Consolidated Stock, it became able to raise on its own security all the money it required at about the same rate of interest as that on which loans had been obtained from the Bank of England under the Treasury guarantee. Nor in this connexion should the large assistance obtained from the Coal and Wine duties be overlooked. For a great number of years they had been the means by which London improvements were largely paid for." Such works as the rebuilding of St. Paul's Cathedral and other City churches after the great Fire of London, the building of the first Blackfriars Bridge, the freeing of old London Bridge from toll, the making of the approaches to the new bridge, the formation of Cannon-street, &c., were effected from this source. After 1861 part of these duties were allocated to the Metropolitan Board for special purposes, more especially for the construction of the Thames Embankment. They, however, were not regarded with favour, either by Liberal or Conservative members, and so in process of time they were allowed to expire, thus putting an end to a useful revenue, which seems to have been raised without disadvantage to the general public.

As regards what was done, as we have already said, the Thames Embankments are the great memorials of the Metropolitan Board of Works, and to these may be added Queen Victoria-street. Any number of details might be given of other works, the aggregate of which has caused a vast improvement in the Metropolis. Such a work, for example, as that of a new direct street from Commercial-road East to Whitechapel High-street, which was effected in 1869, was of the first public importance. The street was 1,200 ft. long and 70 ft. wide. "The new thoroughfare afforded access to the City for a very important class of traffic, and formed a direct line of communication from the City to the docks." It practically brought that fine thoroughfare, Commercial-road East, into the City.

In 1888 the London County Council came into being. That body has been in existence for ten years, and it has not yet really effected any great improvement. There has been an immense amount of academic discussion: a great deal of cry and very little wool, to use a homely saying. But London is still waiting for its new streets. Here and there small improvements have been made, chiefly in conjunction with the Local Authorities. The Embankment from Westminster to Blackfriars was opened in 1870, just about fifteen years after the Metropolitan Board came into existence. Many other useful works had been effected in the meantime. When these results are compared with what has been done by the County Council, it must be admitted that the existing governing body of London has been a failure in regard to Metropolitan improvement.

In this connexion it should also be borne in mind that when the County Council came into office it took over, so to say, "thirteen projected improvements in respect of which the Metropolitan Board had deposited a Bill in Parliament." Of these which have now been completed the cost has been 332,000*l.*, whilst the actual or estimated cost of the improvements initiated by the Council and already completed or in progress is 1,984,000*l.* Among these works in progress is the widening of the Strand, by the destruction of the Holywell-street block of buildings, but to the observer this particular improvement appears still to be waiting a beginning.

* "History of London Street Improvements, 1855-1897." By Percy J. Edwards, Clerk of the Improvement Committee. Printed for the London County Council.

NOTES.

The Paris Exhibition.

THE General Committee for the 1900 Exhibition has drawn up a first list of the artists who are to be invited to undertake the sculpture and other decoration of the Alexandre III. bridge and the palace in the Champs Elysées. M. Frémiet is to execute two of the groups of Pegasus and Fame which are to crown the large pylons at the main entrance, and M. Steiner and M. Granet are to execute the two others for the pylons at the opposite side. Before each of these pylons is to be a large decorative figure; these are to be executed by Messrs. Marqueste, Coutan, Gustave Michel, and Lenoir. M. Dalou and M. Gardet are to sculpture four lions accompanied by figures of children or genii, in face of the entrance to the new bridge, the balustrade of which will carry two figures in bronze, by M. Massoule and M. Léopold Morice. M. Gauquié has been commissioned to carry out the groups of chil-

dren in bronze which will surround the large lamp standards at each side of the bridge. In regard to the Champs Elysées palace M. Joseph Blanc has been commissioned to paint the cartoons for a decorative frieze to ornament part of the large palace, and which is to be carried out in bas-relief by MM. Sicard, Fagel, and Baralis. Lastly, M. Récipon has been commissioned to execute the quadriga groups which will surmount the angle pavilions of the large palace, on the façade towards the new avenue.

An Example of late Greek Sculpture.

IN the last issue of the *Gazette des Beaux Arts* (August, 1898, p. 107) M. Solomon Reinach publishes an interesting marble group now in the museum at Sofia. This museum, under the active and intelligent directorship of M. Dobinsky, is rapidly rising into eminence, and promises to be a good third to those of Constantinople and Athens. The group in question was found on the site of the ancient Odessos, not far from Tomi, the scene of the exile of Ovid. The place was a colony of the Milesians, founded in the sixth century B.C. The group of two figures, 0·43 m. in height, represents, according to M. Reinach, Aphrodite and Adonis. This conclusion he is led to by a study of analogous groups in inscribed Etruscan mirrors. Its special interest lies in the fact that its style is closely analogous to that of a familar group of ancient monuments known as Neo-Attic, and associated with the names Stephanos and Menelaos. This Neo-Attic style prevailed at the end of the second, and beginning of the first century B.C., and is a kind of late repetition of the manner of Praxiteles; its characteristics are a peculiar openness of the ocular cavity, attenuation of the relief of eyelids and eyebrows, and a general dreamy languor of expression.

The Drummond Chapel, Innerpeffrey.

THIS ancient chapel, which since the thirteenth century has been the burial-place of several members of a distinguished Scotch family, has, together with its monuments, been recently repaired at the charges of Lord Ancaster (of the neighbouring Drummond Castle), Viscount Strathallan, and Captain Drummond, of Cromlix. It is situated on a bank of the Earn, between Strathallan Castle and Inchaffray Abbey, Perthshire, being about three miles distant from the latter. Inchaffray—signifying the island of masses—was founded for canons regular from Scone, in 1198, by Gilbert, Earl of Strathearn, and Mathilda, his wife, with a dedication to St. John*. As the name implies, it was once surrounded by water. David, second Lord Drummond, bought it from the Abbot, Alexander Gordon, Bishop of Galloway, for his second son James, afterwards Lord Madderty (Mater Dei), and ancestor of the Viscounts Strathallan. The river or canal ordered by the last Parliament of Scotland to be cut for draining the low grounds around the abbey was named Powaffray, and the word "Inner" prefixed, meaning the junction of the waters, forming Innerpaffray, gave a name to Lord Madderty's residence, where the Pow falls into the Earn. By his wife Jean he got the lands of Innerpeffrey. The Abbey stands on the banks of Powaffray water, in Madderty parish. In Part VII. of "Drummond's British Families" (1845) will be found a view of the ruins, with four illustrations of the seal. Madderty is a corruption of "Mater Dei," the parish church being dedicated to Mary the Virgin.

* The seal, of which two impressions are extant, bears on the obverse and reverse the inscription, "S' Comune Eccle Sci Johis Evangeliste de Insula Missarum."

"Glasgow Architecture."

A CORRESPONDENT in Edinburgh writes to us to say that the name of Mr. "C. H. Wilson," referred to several times in the article on "Glasgow Architecture" in our issue of July 9, as the deceased architect of certain buildings, should have been "C. Wilson." The correction, we are informed, is important, as there was also a Glasgow architect named C. H. Wilson, who was not however the architect of the buildings referred to. We presume that our correspondent is correctly informed; at all events we give his correction. It is extremely difficult, as we have found over and over again, to get accurate information as to the spelling or initials of the names of deceased architects of any city, even from inhabitants of the same place. As an instance, we may mention that when making up our article on the architecture of Aberdeen, our representative was most positively informed, by an Aberdeen architect, that the architect of the West Church was "Gibb," the name of so renowned an architect as Gibbs being thus incorrectly given in his native town. In this case the name was too well known for the mistake to pass; but in the case of names of only local celebrity it is almost impossible to guard against inaccuracies of this kind.

Dundee Institute of Architects.

THE full title of the Dundee Institute, as given on the title-page of their annual Report, which has just reached us, is "Institute of Architecture, Science, and Art," the title being probably chosen with the view of extending the numbers and influence of the Institute farther than could be done by the architects alone in a not very large city. It does not appear, however, that the most has been made of this extension of scope, since on the first page we read that "of the twenty-four Lady Associates elected in November 1891, only six remain on the roll, probably because so little has been attempted to be done by way of enlisting their practical sympathy and aid." This is to be regretted; but the general tone of the Report gives a favourable idea of the activity and energy of the Institute; the address of the President (Mr. T. M. Cappon) at the Conversazione, which is printed in the Report, is a very good one; and the articles describing the visits made to places of interest, accompanied by some illustrations, are exceedingly interesting and well written.

Horsham Cemetery Chapel Competition.

THE *West Sussex County Times* of the 20th contains a brief report of the curiously naïve manner in which the Horsham Burial District Committee endeavoured to obtain competition designs for two cemetery chapels and a lodge. They wrote to three architects, Mr. Buck, Mr. Burston, and Mr. Wheeler, asking for designs for the buildings named, without apparently giving any particulars or even naming the sum to be expended. Mr. Buck wrote asking whether any independent person would be engaged to adjudicate on the designs, what was the sum to be expended, and whether the plans would be sent in under cover of a motto. He was informed that the designs would be judged by the Committee, with the names of the architects attached, and that the Committee left the sum to be expended to the discretion of the architects! He, very properly, declined to compete under these conditions. Both the other architects asked for further particulars, and Mr. Wheeler for an extension of time, as he did not think it possible to prepare a well-matured design in the time named. After some discussion the Committee adhered to their original position, but granted Mr. Wheeler the further time he asked for. Under these conditions it appears that the other two architects are prepared to compete.

Sanitary State of Hackney.

THE annual Report of Dr. King Warry, the Medical Officer of Health for the Hackney District, touches on a good many sanitary evils prevalent in the district, but especially on the old and long-standing grievance of the condition of the River Lea, which seems to be "nothing bettered, but rather grows worse." Into the part of the river bordering on the recreation ground known as Hackney Marshes, the combined effluents from the Walthamstow Sewage Farm and the Leyton Sewage Works are poured, rendering the river so polluted as to form, in immediate contiguity to a much-frequented open space, an undoubted danger to public health. The remedy, the Report urges, is to be found in a main drainage scheme for the Lea Valley—a scheme outlined in the Report of the Select Committee in 1886, and, as Dr. Warry observes, "if necessary then, how much more so now." A great deal of inconvenience has been experienced in Hackney, during the past year, from storm floodings; and the Medical Officer has in previous Reports, it appears, referred to the small amount of fall in the sewers in some parts of the district, and the need of better provision for carrying-off storm water.

No. 41, Mount Pleasant, Clerkenwell.

FOR an enlargement of their Weights and Measures Testing Offices the London County Council have acquired two houses at the west end of Warner-street, numbered 41-3, Mount Pleasant, and their site is now being cleared. Of the two houses No. 41 was much earlier in date than the other. On its front it bears two red brick tablets—the lower tablet of simple design and inscribed "Baynes Street, 1737." The upper tablet is level with the second-floor windows and forms an ornamental piece of fashioned brickwork. Beneath a pointed hood or pediment is a T-shaped panel, within which are cut, in relief, the letters and date "I ∩ P, 1737," and what we take to be the crest of an arm holding a hoop or ring beneath a waved scroll, and the motto, "In God is all our trust;" on either side of the panel are moulded two curled scrolls. The name "Baynes-street" is noteworthy, for the houses now collectively known as "Mount Pleasant" had formerly four names; the block between Laystall and Warner-streets (beneath which ran the Fleet) was Dorrington-street, distinguished by the tablet with date "1720" on the front wall of Nos. 55-7; the block between Warner-street and Coldbath-square, opposite the (old) prison, was Baynes-row; next eastwards were

Coldbath-square, and Cobham-row. Little Baynes-row lay behind Nos. 1-4, Coldbath-square, and extended from Baynes-court into Bath-court. The construction of Rosebery-avenue has greatly altered these features of the district. Coldbath-square originally consisted of the two rows of houses, facing outwards, which stood nearly north and south; in the inner space—once known as Sir John Oldcastle's field—rose the chalybeate spring, whose specific virtues were discovered in 1697 by Mr. Walter Baynes of the Middle Temple, owner of the property we describe. Cobham-row, which had a line of chestnut trees along the pavement, marked the site of the house of Sir John Oldcastle, Lord Cobham, who was burnt in 1418 at St. Giles'-in-the-Fields, as the leader of the Lollards.

St. Mary-the-Virgin, Charing Cross-road.

A NOTICE, in pursuance of the London Building Act, 1894, has been served for the demolition of the south and west walls of this church, which represents all that remains of the old Greek church in Soho. The last service was celebrated on Sunday, 7th instant. It was the first Greek church erected in England, and was built of red brick (in the then Hog-lane, afterwards Crown-street), in 1677, by Joseph Georgeirenes, Archbishop of Samos, who had sought refuge in London from the Turks. A Greek inscription over the west door records that Charles II., the Duke of York, and Henry Compton, Bishop of London, helped in the work. It subsequently belonged to a Huguenot congregation, by name of "Les Grecs," during 140 years, from whom the Calvinistic Baptists acquired the lease. In 1850 Bishop Blomfield saved the fabric from conversion into a music hall and dancing saloon, and it received its present dedication. The adjoining clergy house was built in 1862; about eleven years later the church was lengthened eastwards, after the designs of Messrs. W. Slater and the late R. H. Carpenter—a new north aisle has since been added. Some almshouses formerly surrounded the Greek Church; they represented six separate endowments, 1680-6; the north, west, and south blocks were removed for the erection of Board Schools, and the School Board Laundry and Cookery Centre (1892). The church is depicted, but appears as reversed, in Hogarth's print of "Noon."

"Bertolini's," St. Martin's-street, Leicester-square.

SOME houses on the east side of this street have recently been dismantled. Of one of them, at the corner of Orange-street, the ground floor alone remains. Though commonly neglected in the London guide-books, it was a famous house in its day, being a hotel and coffee-house kept latterly by Mme. Bertolini, and a favourite resort of men of letters, actors, and musicians in the earlier half of the current century. The house, No. 34, afterwards "Foot's American Restaurant," is sometimes described as that which was occupied by Sir Isaac Newton, and the Burney family, whom Mrs. Thrale called her "dear Newtonians." But Newton's house, No. 35, still stands, partly untenanted, in St. Martin's-street, between Long's-court and the Orange-street Congregational church. It was lately occupied by the Warrant Officers' Club. The adjacent ground, and the sites of Nos. 4 and 5, Long's-court, 34 and 35, Leicester-square, and 23, Green-street, have been cleared for the proposed new buildings of the Dental Hospital of London.

The "Art-Union" Engraving.

THE large engraving which the Council of the Art-Union of London annually present to their subscribers is, this year, a reproduction of Mr. Briton Riviere's picture of a saintly knight on a frightened horse preparing to descend into a dark and presumably haunted forest, with the words "In Manus Tuas, Domine" as a title; a work which was exhibited at the Royal Academy in 1879 The reproduction is an etching from the capable hands of Mr. C. O. Murray, but in that highly worked and finished style which may more properly be called engraving with the etching-needle than etching in the artistic sense of the word. It is a conscientious and forcible rendering, on an unnecessarily large scale, of a picture which, like most of the Art-Union presentation subjects, has that kind of easily apprehended meaning which appeals to the general taste of the middle-classes of this country, who value a picture more for its moral than its artistic quality.

THE DESIGNING AND CONSTRUCTION OF REFUSE DESTRUCTORS.*

IN the design and construction of a successful and economical refuse destructor plant the following are the principal points which must be borne in mind:—

A. It must never be forgotten that the primary object of a refuse destructor is, as its name implies, to destroy refuse, and to destroy that refuse as completely as possible and without the production of any description of nuisance. By the term to destroy refuse in this connexion is implied a practically absolute chemical separation of the combustible portions of the refuse (such as the carbon, phosphates, and nitrates which are found in cinders and in animal and vegetable matter) from the non-combustible portions (which are chiefly mineral), and includes the complete oxidation of the former class and the fusion and agglomeration so far as is possible into hard clinker of the latter parts. It must be regretfully admitted that in a very large number of destructors these important objects are only attained to a very limited extent.

In order to ensure a perfect result:—

(1) A high temperature must be attained; 1,300 deg. Fahrenheit is admissible, but 1,600 deg. to 1,800 deg. Fahrenheit is better. It is not sufficient to impart the desired temperature to the furnace gases after they leave the furnaces. Such devices as Mr. Jones's Patent Fume Cremator (intended for this purpose) have done good service in their day in preventing the abominable emanations from the chimneys of old-fashioned low temperature destructors, but at the best such a device as a fume cremator is only useful in securing perfect oxidation of the gases and vapours distilled from the refuse, while giving no assistance whatever towards completing the other and equally necessary part of the process, namely, the reduction to innocuous clinker of the solid refuse itself. For this purpose it is essential that a high temperature must be kept up in the furnace itself as well as in the flue.

(2) Having provided means for securing a high temperature in the furnaces and the flues, such arrangements must be made as will secure that the whole of the refuse and the whole of the products of combustion or distillation must be subjected to this high temperature, in presence of sufficient air, and for a sufficient length of time to insure complete oxidation of all combustible substances.

(3) It is also necessary that the products of combustion passing up the chimney must be as free as possible from solid matters, such as dust, which, although they may be so perfectly burnt as to be free from any taint of putrefaction, yet their mechanical effect upon the leaves of trees and plants, upon the lungs of persons and animals, and upon clothing and furniture, are such as to become an intolerable nuisance, and a nuisance which has been proved in more than one instance to be actionable at law.

B. The destructor must be so designed as to involve the least possible expense in its working. To this end the handling of the refuse should be reduced as much as possible, though it must be borne in mind that the adoption of cumbrous and complicated mechanical feeding arrangements has hitherto been found to give no relief in the matter of labour; in fact, it has even involved additional labour, while at the same time such machinery is frequently very costly both in construction and in upkeep and working charges. It must always be borne in mind that machinery working in the presence of large quantities of dusty and dirty material deteriorates very rapidly, and any machinery which is required about a destructor, particularly electrical machinery, must be so arranged as to be nearly as possible boxed in and protected from dust. The author would mention as an instance the Shoreditch combined electrical lighting and destructor plant, where a large proportion of the total current produced appears to have been used on the works in driving fans, lifting machinery, &c. The author believes that this excessive expenditure of energy is due in a large measure to the extra resistance caused by the impossibility of keeping switches, brushes, &c., in proper order in presence of dust and dirt. In order to ensure economy, the safest points to bear in mind are that the refuse should be brought in the collecting carts as near as possible to the charging holes of the furnaces, and the tipping arrangements should be such that a minimum of work is involved in properly charging the furnaces. It must also be remembered that considerable judgment is required in working a fire, and that judgment is not usually a faculty possessed by machinery. In order to obviate any difficulty in separating clinker from unburnt matter, and in order to insure as nearly as possible a continuous process in the furnaces, they should be fed at one end of the grate and clinkered at the other, and the arrangements at the clinkering end should again be such as to involve the least possible labour in removing the clinker and to avoid altogether the necessity for breaking it up in order to get it through small openings.

C. In these days people are not content with getting rid of the refuse in an inoffensive manner. It has been demonstrated that large quantities of heat are available from the combustion of refuse, and therefore it has become necessary that this heat should be utilised, and at present almost the only practicable method of utilising the heat is in the evaporation of water. When it has been shown that in practical use eight tons of refuse will raise as much steam as one ton of good coal burnt under good conditions, and that it will raise that steam to the highest working pressures ordinarily adopted, there can be no doubt as to the advisability of providing sufficient boiler room and arranging a suitable use for the available power. In order to secure the best results the boilers must be placed near enough to the cells to prevent any important loss of heat by radiation, but they must not be placed near enough to interfere with perfect combustion of the gases, which is generally not completed until after they have left the furnaces and traversed a certain length of flue to insure proper mixing. It must be borne in mind that even in boiler firing with coal any contact of the gases with comparatively cool cross tubes, &c., before they are perfectly oxidised, will check the combustion and cause smoke, and it is obviously useless to mix any further oxygen with such unburnt gases after they have dropped below their natural temperature of combustion or "flashing point." It may here be mentioned that water-tube boilers are the most readily adapted to the requirements of a destructor station, although very good results have been obtained with other types, particularly Lancashire boilers. The comparative safety of water-tube boilers from explosion, and their general handiness and convenience, render them particularly adapted for working where the labour employed is not of a highly cultivated order, and generally in connexion with these plants it is best to remember that whatever apparatus is provided it will probably have to be worked by stokers.

D. The solid matters resulting from the

* A paper read by Mr. F. L. Watson, Assoc. M. Inst. C.E., on the 19th inst., at the Dublin Congress of the Royal Institute of Public Health (Engineering and Building Construction Section).

combustion of the refuse, *e.g.*, clinkers, from off the grates, and fine ashes from underneath them, must be made use of for two reasons. First, if they are not made use of, they must be carted away and tipped to waste at a further cost. Second, they may be made a valuable source of revenue. It must not be forgotten that we have here another powerful argument in favour of high temperature destructors, the clinker from which will be completely fused, and will contain no combustible or putrescible matter, and will therefore be of a hard and sharp nature in contradistinction to the clinker from low temperature destructors, which is soft, friable, and totally useless, and frequently even putrescible. It is no uncommon thing for such half-burnt clinker to take fire again after being tipped into a heap, and thus to occasion serious nuisance. Assuming, however, that the clinker is going to be of a hard and useful character, we shall require machines for breaking it up, grinding it, and mixing it with lime, &c., to form mortar, and these machines must be powerful, massive, and durable. Having thus briefly sketched the requirements of a destructor plant, the author will proceed to give some details of the manner in which these objects have been attained in one or two plants in the design and construction of which he has been concerned.

This purpose will perhaps be best served by a brief description of the plants in question.

1. *The Powderhall Destructor, Edinburgh.*—This is a 10-cell plant. It was originally of the Fryer type, having been constructed in the year 1893. The working of the destructor, however, gave rise to serious complaints from the neighbours, culminating in an action for nuisance by the proprietors of the neighbouring estate of Redbraes, on which were situated some nursery gardens. It was held by the High Court at Edinburgh that a serious nuisance had been established, and the Corporation were condemned in damages and costs. The costs, owing to the very large number of expert witnesses called on both sides, were extremely heavy. The Court appointed Mr. Benjamin Hall Blyth, the eminent civil engineer of Edinburgh and Westminster, to confer with Professor William Odling, of Oxford, and to report to the Court as to the practicability of remodelling the destructor in order to prevent a recurrence of the nuisance. Mr. Blyth inspected the most important destructors in England, and his report to the Court was to the effect that if the type of destructor in use at Oldham and at Leeds were adopted the nuisance would be abated. Thereupon the author's firm made an offer to the Corporation to take upon their shoulders the whole responsibility of the alteration, and to guarantee that all the causes of complaint should be removed. A formal contract was entered into, Mr. Hall Blyth being retained as referee, and the contractors bound themselves to fulfil all their obligations to his entire satisfaction. It so happened that the grates of the old furnace were of practically the same dimensions as those of the Horsfall Standard Cell and therefore the furnaces were only pulled down to the level of the grate bars, the foundations and ashpit walling being left in place. After the heavy expenses to which the Corporation had already been put, there was a natural desire to economise as far as possible in the alterations, and therefore some of the old ironwork, including the clinkering doors, was made to do duty over again. These clinkering doors are of a somewhat awkward pattern, They swing upwards on hinges, and are provided with balance weights, working into recesses in the furnace fronts. The hinges give a good deal of trouble from sticking, and although the doors have the advantage of providing an opening right across the grate for the removal of clinker, they have the great disadvantage that the amount of opening is fixed—that is to say, they must be either wide open or shut, and when they are wide open the hot baffle plate at the back of the door reflects great heat on to the arms, hands, and faces of the workmen. With the exception of these and some other minor details, the furnaces as reconstructed are of the Horsfall standard pattern. They are built in a double row back to back, five cells on each side. Each pair of cells communicate at the back with a feed hole 2 ft. square common to the pair of cells. The feed-hole has a flat table at the bottom, and the refuse is pushed over the edge of this table by means of a three-pronged fork. It falls down on to the sloping dry hearth of the furnace. The sides of the furnace flare out sideways from the feeding end down to the grate, so that when the refuse is once pushed over the edge of the table at the bottom of the feed-hole it cannot possibly stick. In this manner somewhere about a cubic yard of refuse is fed in at one operation on to the drying hearth. The operation of feeding takes place a few minutes after the operation of clinkering, the red fire on the grate being given a short period to brighten up under the action of the blast before the fresh refuse is drawn on. The stoker on the clinkering floor pulls the refuse forward from the drying hearth on to the grate bars, and spreads it evenly over the grate. It should be mentioned that the drying hearth is paved with fire-brick, and is kept hot by being in close proximity to the main flue. It is found that 6 ft. is the maximum length of grate which can be conveniently worked by the men. It is also found that making the grates 5 ft. wide insures the handiest and most economical disposition of the labour, therefore each grate is 5 ft. wide by 6 ft. long, or 30 square ft. in area. The grate bars in the Edinburgh destructor are of wrought iron, rivetted together in slabs of four. Each bar is of a tapered section, half an inch thick at the top and three-sixteenths at the bottom edge. The distance pieces or washers between the bars are cut from the bars themselves and inverted, so that the air space between the bars is three-sixteenths of an inch wide. They are made in 6 ft. lengths. There is thus no joint in the middle of the grate for the firing tools to get caught in. Each furnace is provided with hollow cast-iron sides, having removable plates next to the fire. The air from the forced draught apparatus is introduced into these boxes, which communicate for that purpose, with a blast flue common to each row of cells. The boxes are closed above the grate. They communicate with the ashpit by openings controlled by valves. The valves are operated by handles placed below the clinkering door. These side boxes serve a double purpose—first, the air is heated, and second, the brickwork of the furnaces is protected from the erosive action of the clinker, which in ordinary brick-lined furnaces adheres to the brickwork and brings away small particles of the same at every time of clinkering, so that the furnace sides become rapidly eaten away. Ordinary iron plates will not stand the heat, but this difficulty is completely avoided by the side box arrangement alluded to. The blast flues are placed one on each side of the main flue, so that any heat which is given up by conduction from the sides of the main flue is communicated to the air and finds its way back to the furnaces to assist in promoting rapid combustion. Each blast flue communicates at its outer end with a vertical flue, in which is placed the forced draught apparatus. This consists of a large steam jet blower of an improved and patented design, a row of adjustable flat steam jets being placed so as to introduce a powertul current of air in a cast-iron trumpet, also of a flat shape. The use of these steam jets saves a good deal of expense and trouble in keeping an engine and fan in running order, and they require no skill and attention, besides which the steam is of considerable assistance in raising the temperature in the cells. The flues are arranged according to Horsfall's well-known patent. The whole of the products of combustion pass out of the furnaces at the front end through openings in the arch immediately above the clinkering door. It will thus be observed that the gases pass away at the clinkering or hot end of the furnaces, in contradistinction to the Fryer destructor, in which the gases pass away at the feeding or cold end of the furnaces. The front flue arrangement insures that any vapours given off by the green refuse in drying shall be mixed with the hot flames from the blazing refuse, and the furnace crown and cross flues are thus raised to a red or white heat, the bricks retaining their high temperature even after the fires are freshly charged, and thus ensuring that at all times and in all states of the fires the gases are perfectly consumed. The cross flues run back over the top of the cell, the two flues from each pair of cells meeting at a point over the centre of the main flue and communicating therewith by a vertical passage. On looking into the main flue of one of these destructors, bright blue flames can always be seen descending through these passages. In order to be visible at that point the flame must be at least 25 ft. long, and persons who are familiar with furnace work will realise that the production of a bright flame 25 ft. long from ordinary house refuse, mixed with decaying fish and other matter of the most abominable description, is no mean achievement. It is found that when a considerable number, say six cells or more, are combined in one block, the mixing of the gases from the various furnaces insures a very steady and very high temperature in the main flue, and it is therefore always found advisable to construct the furnaces in blocks in this manner rather than to divide them up and put boilers between them. At Edinburgh the main flue communicates immediately with a large dust-depositing chamber, circular in form and of somewhat peculiar construction. This chamber is shown upon the diagram. The gases pass first into the outer cavity, swing round this, enter the inner cavity or well at the top, and leave it at the bottom. Various baffles are provided in the outer cavity. The swirling action thus produced causes any small quantity of dust which the gases may contain to be deposited within this chamber. The exigencies of space were the cause of the dust-catcher being placed between the cells and the boiler, which doubtless causes some loss of heat. The boiler is the original boiler belonging to the old destructor. It is of the multitubular type, and is not nearly large enough to use the whole of the heat from the cells. It, however, produces steam for forced draught apparatus and for driving a mortar-mill and an electric light plant, which provides light for the destructor-house and a range of stables and superintendent's house belonging to the cleansing department.

The effect of the alterations carried out by the author's firm was that all causes of complaint were entirely removed to the satisfaction of the referee.

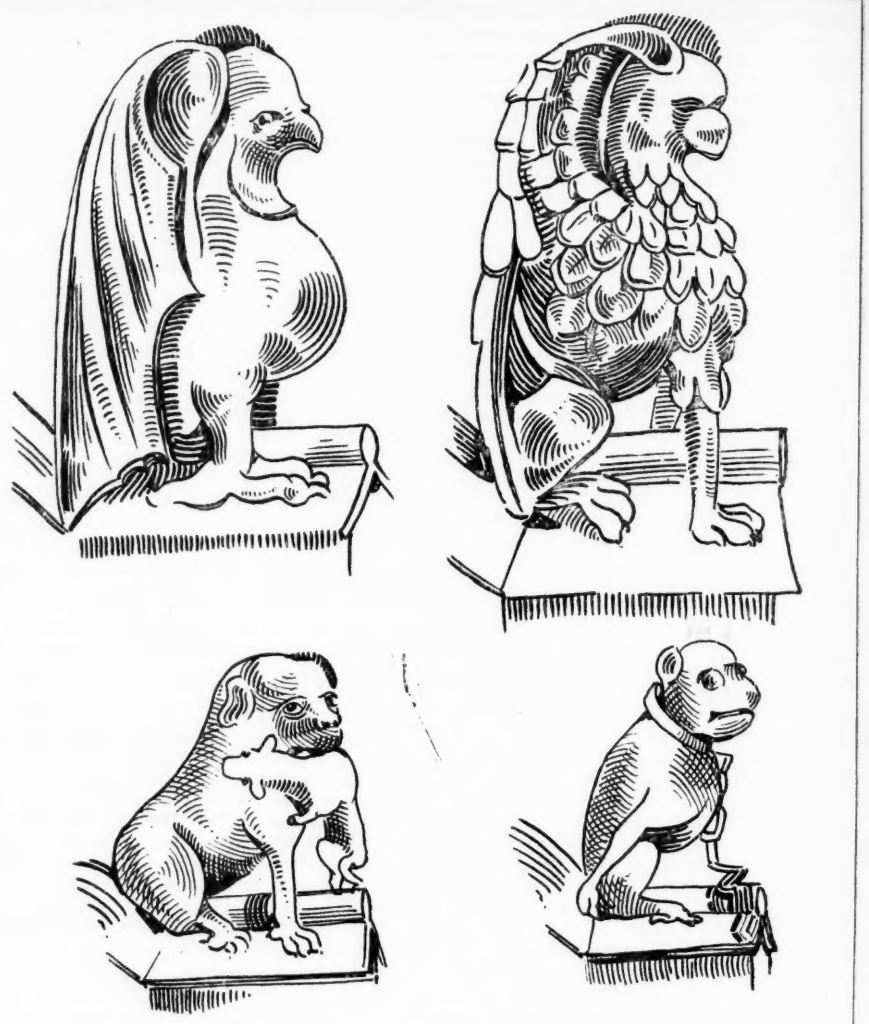
The tipping arrangements are as originally designed. There is a tipping-floor on each side of the row of cells, and the refuse is tipped from the carts on to the furnace top in close proximity to the feed-holes. To prevent stewing of the refuse on top of the cells, the charging-floor is honeycombed with drain pipes, communicating with the forced draught apparatus, whereby fresh air is continually drawn through the pipes.

We may now proceed to a brief description of the 12-cell destructor at Hammerton-street, Bradford. In this case, as in the case last described, there was originally a Fryer destructor. It had, however, been fitted some years ago with Horsfall's forced draught apparatus, and it worked with fair success until it was considered by the Corporation to be worn out. The contract for re-constructing the furnaces was then entrusted to the author's firm. The destructor consisted of two blocks of six cells each, with a pair of multitubular boilers and a chimney between the two blocks. Each block of cells has a passage through one boiler and an alternative passage direct to the chimney. These cells were ordered by the Corporation to be completely removed to the ground level, and the new cells were constructed entirely with new material and according to improved designs prepared under the immediate supervision of the author. The flues are arranged exactly as described in the case of the Edinburgh destructor, the dimensions of the cross flues being slightly enlarged in the light of more recent experience. The dimensions of the charging holes and feeding table were also slightly altered for the same reasons, in order to insure a greater facility in charging. Observations having been made with regard to parts of the old destructor which had failed after years of service, the new one was constructed with much heavier end walls and with far more massive stays. It is tied together by means of heavy rolled steel joists 8 in. by 4 in., and tie-rods $1\frac{1}{2}$ in. diameter, swelled to $1\frac{3}{4}$ in. to receive the nuts, and there are two steel channels, 12 in. by 3 in., running the whole length of the block of cells over each furnace front. It was found that the ordinary cast-iron washer blocks through which the tie-rods pass, and which hold the channels in position were liable to give way under expansion of the furnaces. Cast steel washer blocks were therefore substituted, and very heavy spring steel washers were placed under the nuts in order to allow a certain limited freedom of movement. These improvements have been quite effectual. The side boxes were also improved by placing the controlling valves in the neck of the boxes and cutting off the supply of air at the point of junction with the blast flue, the openings from the side boxes in the ashpit being always left

open. The blast is controlled by large swinging valves placed in cast iron boxes built into the arch of the blast flue and bolted up to the side boxes. The movable plates which close the front of the boxes are of an improved pattern held in place with spring wedges, and after nearly twelve months of continuous hard work not one of these plates has shown the smallest sign of either burning or cracking. The clinkering doors are also of an improved design. They are constructed similarly to the doors usually employed on plate furnaces, being hollow castings with a space at the back, which is filled up with fire bricks. The door is balanced by a solid cast balance weight provided with a handle, and is suspended by a wire rope passing over two pulleys. Although the door weighs 5 cwt. and the balance weight the same, there is not the slightest difficulty in opening or closing it with one hand. The ash-pit doors and flue doors are very carefully designed and fitted up, the faces of the doors and frames being planed and the pin holes drilled with the door in position, thus insuring a perfectly close fit. They are held by lever catches working on wedged-shaped faces. The boilers belonging to this plant were not disturbed, and they are, like the Edinburgh boilers, of the multitubular type, and not half large enough to take up the whole of the heat. They supply steam, however, for the forced draught apparatus, which is of the same pattern as at Edinburgh, for a large quantity of clinker-grinding and mortar-mixing machinery, for the electric lighting of the works, and manager's house and office, and for certain fish-drying pans belonging to a private enterprise. The Corporation contemplate putting down more boilers and machinery to utilise the heat from the destructor. The results of the building of the new cells have been as follows :—The capacity of the destructor, which was formerly 7½ tons per cell per twenty-four hours, has been increased up to 10 tons per cell per twenty-four hours, and since the men have been used to the cells a further increase up to 11 tons has taken place. This is without any increase in the number of men employed. The cost of labour has been reduced from 7½d. to 8d. per ton under the old system to just over 5d. under the new system. This is by several pence the lowest authenticated cost of labour in the world. The temperature in the cells and flues has been very largely increased and the smoke from the chimney has been reduced to an absolutely inappreciable quantity ; in fact, it requires a remarkably clear state of the atmosphere to be able to distinguish anything from the chimney top at all, although no dust-catcher is in use and the chimney is quite close to the cells. At Hammerton-street an ingenious arrangement of overhead railway, carrying a swinging truck, into which the clinkers are pulled direct from the furnaces, has been applied to both of the blocks of cells. This is the invention of Mr. Cox, the city engineer, and Mr. McTaggart, the superintendent of the cleansing department. Improved machinery for dealing with the clinker has also been introduced, and it is a fact that since the new cells were got to work there has not been the slightest difficulty in disposing of every ounce of clinker, fine ash, and flue-dust produced, at a profit, either in the shape of mixed mortar or of ground ballast for making plaster, concrete, &c. At the present time machinery is on order for the manufacture of artificial stone from the clinker.

The Norwich Destructor.—This is a two-cell plant, erected at the new mills sewage pumping station of the Norwich Corporation. It was put down specifically for the purpose of raising steam, tenders having been invited upon the basis of specifying the quantity of steam to be raised instead of specifying the number of cells required. The destructor is of the single-row type, but is fed from the top, this design having been adopted to suit an existing building which it was desired to utilise. The boiler is of the Babcock and Wilcox type of 735 square feet of heating surface. It is placed as close as possible to the pair of cells, and communicates directly with the chimney. It supplies steam for driving air compressors for Shone's patent sewage lifting machinery. The working pressure is 120 lbs. per square inch. The main features of the furnaces are precisely the same as those at Bradford. The feeding arrangements are somewhat different, there being no room to make an inclined approach roadway for carts to tip on to the top of the furnaces as is the case at Edinburgh and Bradford. There is a pit provided below the ground level. In this pit several hopper wagons run on rails. They are brought up to the tipping beam and the carts tip into them. The bodies of the hopper wagons are then lifted off the wheels by a travelling crane and conveyed to the charging holes of the furnaces. The doors in the bottom are opened and the refuse dropped on to the drying hearth. These two furnaces, on their official trial by the city engineer of Norwich, were found to burn 30 tons of refuse per twenty-four hours, or 15 tons per cell per twenty-four hours. They evaporated over 2,400 lbs. of water per hour from cold river feed to a steam pressure of 120 lb. per square inch. These results are largely in excess of the maker's guarantee. The general results obtained from this plant have been of a highly satisfactory character.

At this point a brief description of the plant which is about to be erected for the Pembroke Township Commissioners, County Dublin, in connexion with their electric lighting station, may not be out of place. The general scheme of the plant has been arranged to suit the electric lighing plans of Mr. Robert Hammond, the consulting engineer of the Commissioners. The destructor will consist of two cells of the same size as those at Norwich, and a Babcock and Wilcox boiler also of the same size. The boiler will be capable of withstanding a working pressure of 150 lb. per square inch, the proposed working pressure of the electric light boilers being 140lb. The furnaces will be of the back-fed type, obviating the necessity of tipping the refuse on the top of the furnaces and saving 6 ft. in the height of tipping platform, and consequently reducing the slope of the inclined road. The tipping platform and building of the destructor are to be large enough for a plant of double the size, which will probably soon become necessary. When that time arrives all that will be required will be to add two cells and another boiler of the same size. For all this provision is made in the original scheme. The tipping platform is so arranged that the coal for the electric-light boilers will be tipped from it exactly where it is required, and the space under the tipping platform will form on one side coal bunkers and on the other side a cable store. The destructor, in addition to relieving the Commissioners of a large quantity of objectionable refuse, will provide some 80 horse-power in aid of the electric-light station and in reduction of the coal bill. This will be the first high-temperature destructor to be erected in Ireland, and it will also be the first destructor in Ireland combined with a public electric-lighting plant. The Commissioners of Pembroke township are therefore to be congratulated upon their foresight in becoming the pioneers of the sanitary disposal and economical utilisation of town refuse in Ireland.



Finial Figures, Woolpit Church. Sketched by Mr. H. Percy Adams.

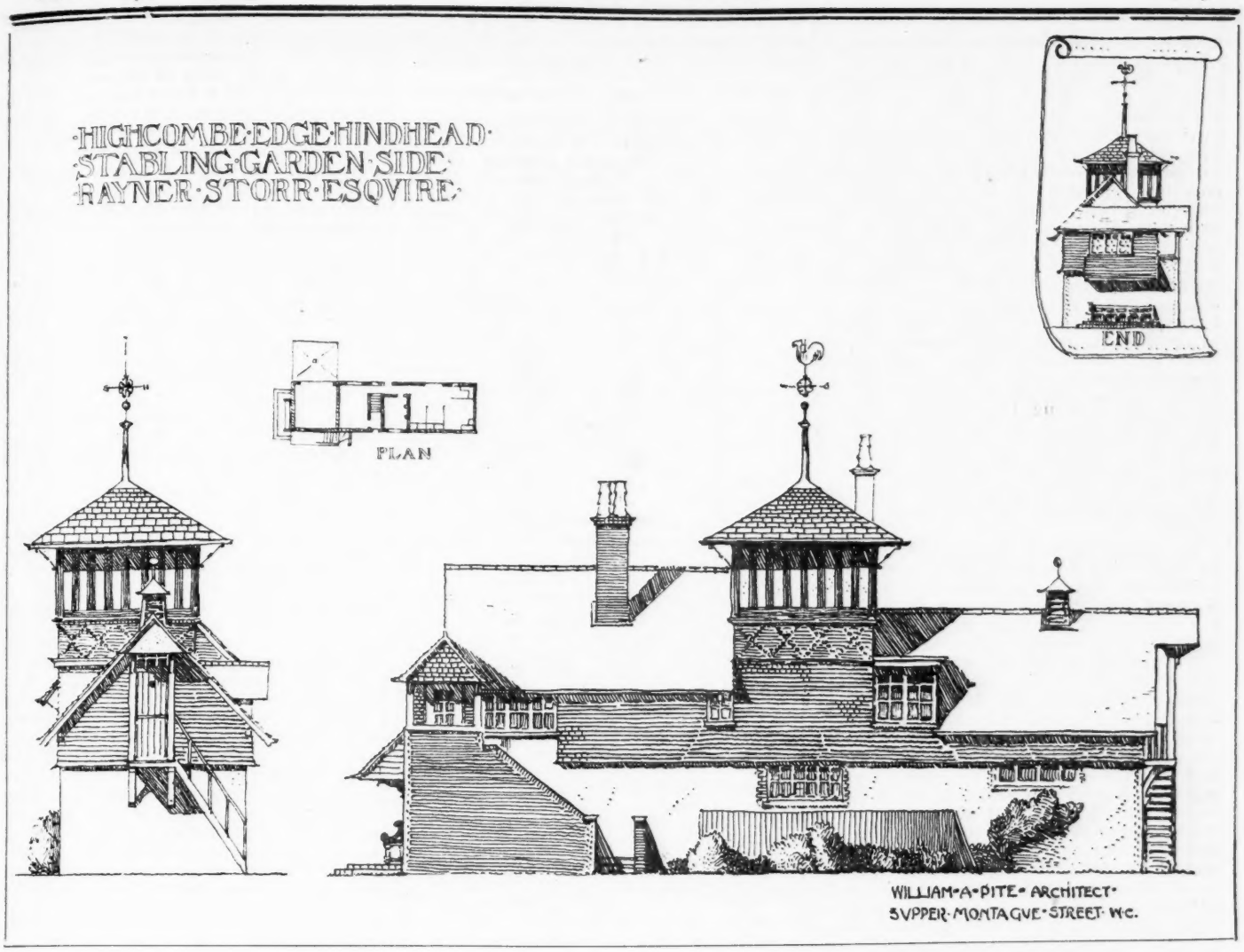
BUTTRESS FINIALS, WOOLPIT CHURCH

THESE characteristic examples of mediæval grotesques from Woolpit Church, Suffolk, are from sketches by Mr. H. Percy Adams.

COMPETITIONS.

PUBLIC PARK, WIDNES.—The first premium of thirty-five guineas in the public competition for the best design for laying-out the Appleton House Estate as a public park has been awarded to Messrs. William Barron & Son, Elvaston Nurseries, Borrowash. The area of the park is about 36 acres, and in addition to the general plan of the park, which contains a lake, cricket and recreation grounds, lawn-tennis grounds, bowling-green, gymnasiums, &c., Messrs. Barron & Son furnish three alternative plans for dealing with Appleton House and premises ; also designs for entrance gates, band-stands, shelters, fountains, &c.

NEW CAFE, BOTANIC GARDENS.—At the Botanic Society's Gardens, Regent's Park, a new public cafe has been erected, together with a private dining-hall (45 ft. long by 30 ft. wide), reading and reception rooms, and ladies' and gentlemen's cloak-rooms. There is a spacious "hall lounge," entered from the main conservatory. With the exception of the cafe, the building is intended for the exclusive use of Fellows of the Society and their friends. The foundations and superstructure were carried out by Messrs. Huntley Bros., of Croydon ; the decorations and furnishing by Messrs. Maple & Co. ; and the heating by the Thames Bank Iron Co. The architect is Mr. H. W. Hetherington Palmer, London.



STABLING, HIGHCOMBE EDGE, HINDHEAD.

The stabling here illustrated was recently erected for Mr. Rayner Storr, in connexion with a house at Hindhead. It provides two stalls, loose box, and man's apartments. The long elevation illustrated overlooks the tennis lawns, and has a garden room approached by outside steps. The tower encloses the water-tanks, fed from a well, and supplies the house. The materials are brindled brick, trimmed with red, Petersfield tiles to the roofs, and Elterwater slates on the tower. William A Pite.

CONGRESS OF THE ROYAL INSTITUTE OF PUBLIC HEALTH.

On Thursday last week the opening discussions at this Congress took place in various halls placed at the disposal of the committees by the Provost and Council of Trinity College, Dublin. On the first day over 1,500 members had inscribed their names, and before the sittings terminated the membership had reached over 2,000. All the four sections into which the Congress was divided met at ten o'clock, but after a brief sitting adjourned to attend the inaugural general meeting, at which the President of the Institute of Public Health, Professor W. R. Smith, presided, and at which Sir Charles Cameron, the principal Medical Officer of the City of Dublin, was appointed President of the Congress.

The proceedings of Section C, devoted to Engineering and Building Construction, opened in the Engineering School on Friday with the inaugural address of the President, Mr. Charles P. Cotton, M.Inst.C.E., Chief Engineering Inspector of the Local Government Board, Ireland.

President's Address.

After remarking that it was as true of a nation as of an individual that its maximum amount of working energy was directly proportionate to its physical health, and giving instances of the efforts made in various ancient states to encourage sanitary improvement, he observed that one important means of protecting and improving the condition of public health lay in the extension of the towns. In order to test the soundness of this suggestion, it must be ascertained what advantages, from the point of view of public health, the towns possessed over other districts. Roughly speaking, all human habitations were divided into two broad classes, those in the towns or cities and those in the country, and an extension of the towns might seem to imply an invasion of the country by city influences, robbing it, perhaps, of some of its rural charms. But very little reflection would show that no such results would follow. The limited powers which Corporations and other Municipal bodies possessed under ancient charters and early statutes of dealing with the public health were greatly extended and enlarged by a series of Acts of Parliament, beginning in the year 1828 and followed up by the Towns' Improvement Act of 1854 and the various Amending Statutes. This legislation had for its object, first, the creation of new municipal bodies, with certain powers for dealing with the public health; second, to confer similar powers on those already existing, for the purpose of making better provision for the health and comfort of towns, as specified in the schedule to the Acts. Time would not permit him to make an exhaustive analysis of these provisions, but they might be shortly summarised as follows :—

1. They provided for the abatement of all nuisances.
2. For the regulation of sewers and drains and all sanitary conveniences.
3. For the cleansing of streets and houses.
4. For the supply of pure water.
5. For the erection of public baths and wash-houses, and
6. For the regulation of burials and cemeteries.

To effectually carry out the foregoing these corporate bodies were empowered to make by-laws regulating their due enforcement. From time to time these statutes were amended, according as exigencies arose requiring them. Then came the salutary provisions of the Public Health Act of 1878, which had done so much in the advancement of sanitary science. It also authorised the Local Government Board to confer large and increased powers on the various municipal towns in the promotion of the public health. It dealt with such important matters as the over-crowding of houses, the inspection of lodging houses, the dealing with offensive trades, and the keeping of swine, so as to constitute nuisances. It empowered houses unfit for human habitation to be condemned. It provided for the construction of special hospitals for epidemics and infectious diseases, and generally aimed at the prevention of everything injurious and the promotion of everything beneficial to the public health. And by a later Act passed in the year 1896 all these powers could now be conferred on the several rural authorities. Such, therefore, being a brief outline of some of the advantages which the towns possessed in this matter of public health, and Parliament having thus affirmed the principle that it was desirable to extend them to the rural districts, the conclusion seemed inevitable that what was beneficial in the one case must be equally so in the other. Nature, as exemplified in country life, is none the worse for the aid of science. The old poets were fond of depicting a state of Nature as one of Arcadian bliss, but the truer doctrine of civilised life, as being more likely to realise man's highest ideal, found expression in the well-known line

"Better fifty years of Europe than a cycle of Cathay."

The scientific principles which experience had taught man to be so valuable for the preservation of health in the towns which his industry and skill had constructed, must be equally sound in their application to the country. Therefore it was that whether the towns themselves were extended, or the sanitary rules which prevailed there, to wider and larger areas, in either event it would be a means of promoting public health, and as such he commended it to the approval of that distinguished assembly.

A cordial vote of thanks was accorded on the motion of Mr. Kaye Parry, and a paper followed by Mr. Frank Leslie on "The Designing and Construction of Refuse Destructors," which, as it forms a good summary of the present position of the subject, we give in full on another page.

Before the adjournment a paper was read by Mr. James Dillon, past President of the Institution of Civil Engineers of Ireland, on "The Subsoil in Relation to Sites for Dwellings."

Subsoil in Relation to Sites.

Mr. Dillon dealt with his subject with special reference to Ireland. The sites of many of the

old towns in Ireland had been badly chosen in a hygienic sense; the majority lay above limestone, granite, and sandstone rocks, particularly limestone rock. Nearly all were built before the introduction of water-closets, or water-carried sewage, or high-pressure water supplies. The old privy or petty ashpit system still existed in many of the towns. Surface drainage only was provided for in many towns by imperfectly-built rubble masonry sewers, with and without bottom flags, designed for the conveyance of rain, storm, or flood waters only, but, of course, not water-tight. The water supply for many of these towns was obtained from wells sunk in the towns, or from springs or river water, and who could be in a position to state, should cholera visit the country, that no sewage matter could find its way into wells or pump-holes surrounded by leaky, square rubble-built drains? It was obvious that no time should be lost in compelling the town authorities throughout Ireland to at once abandon their mixed systems of wells, pump-holes, ancient privies, modern water-closets, and leaky sewers, as their continuance must sooner or later lead to fatal results.

In regard to sites for dwellings, the weather in winter was damp and chilly, and though rainfall was less annually than in England or Scotland, it fell more frequently. The prevailing wind was S.W.; there was an average of 1,431 hours of sunshine in the year, falling to fifty hours for each winter month. From this it was obvious that dry, porous, well-drained, sandy soils should, if possible, be selected for dwellings, the surface of the land being somewhat higher than the land surrounding it. The subsoil or arterial drainage should be perfected to a depth of at least 5 ft. or more below the surface. A good and sufficient outfall should be obtained of at least 5 ft. above the levels of the highest underground or flood waters. The districts surrounding the dwellings or towns should be well-cultivated, well-drained, and, if possible, sandy districts, particularly on the side of the prevailing wind. Fir, pine, or other plantations might with advantage stand to the west of a good building site. When travelling through Ireland he found that high, well-drained bog-land, covered with heather, was considered by the local people very healthy, and during the great failures in the potato crops from time to time, potatoes grown in newly-reclaimed bog-land mostly escaped the disease. Rocky sites for building dwellings on or for towns should be avoided, unless composed of porous rock foundations, as the undulating, or depressions, in the surfaces of the solid rock, whether 100 yards or 1,000 yards in length, held up the water on which the subsoils rested. This was one of the reasons why some houses were damp when built on rock foundations. Wet, retentive subsoils bring about similar results—banking up water in the subsoils.

Before finally deciding upon building sites it was well to test their subsoils and drainage outfalls in the middle of a winter and middle of a dry summer. When it was intended to build many dwellings it was well to build only a few at first, to test all matters that could in any way affect them injuriously.

Hidden Dangers in Sites.

Mr. Edward Magennis, M.D., then read a paper on "Hidden Dangers in the Sites of Dwelling-houses." In the course of the paper he stated that the houses in many of our towns, especially in our large towns and cities, are erected upon sites that are simply the hiding places of sewers, upon mounds that contain the remains of our ancestors, on locations that have been the reservoirs of all filth, decaying animal and vegetable matter, street sweepings, and other most objectionable materials. In winter the heat of the building and the aspirating action of fires must tend to draw noxious gases in large quantities through the surface of the soil, and thus engender disease if preventive measures be not adopted. We know that amongst the many evils attributed to insanitary sites are reckoned typhoid, cholera, yellow fever, dysentery, rheumatism, and the numerous respiratory diseases so common in our climate. England in twenty-two years of continuous war lost 79,700 lives, in one year of cholera, one of the most preventable diseases, the death-roll number was 144,860. He suggested three remedies: first, effective drainage; second, that the entire site of the house within the external walls should be covered with an impervious layer; and the third, that an horizontal damp-proof course be inserted in the walls above the level of the ground adjoining.

The Disposal of Sewage in Tropical Climates.

On the resumption of the reading of papers in the Engineering Section on Saturday morning, Mr. C. P. Cotton again presided. He first called upon Mr. J. Desmond, formerly Administrator of the Gold Coast, to read a paper on "The Disposal of Sewage in Tropical Climates." The paper dealt principally with the West Coast districts of Lagos and the Gold Coast. Referring to the former place, he said that a great danger was created by the storage of sewage matter in house pits and down in the loose sand. That system contributed largely to the high death rate which prevailed. Water was contained in wells, from which the people drew their drinking supply; but these wells became contaminated by the passage of sewage matter through the soil. He made an analysis of the contents of twelve of these wells, and found the water seriously contaminated. Having given the matter a good deal of consideration, he recommended that in order to get rid of the dangers arising from that contamination the soil should be cleansed by abolishing the numerous house-pits, and with regard to the wells, he suggested that every well sunk should be allowed a drainage area of a hundred yards; that instead of deep wells, covered pump wells should be provided, that they should be prevented from leakage by the use of cement, and that a space around each of them should be bricked and cemented. The improvements, however, were not carried out, and the wells were still in an unprotected state. With regard to the proposed abolition of the house pits, the natives had an insuperable objection to such a measure. Some details were then given with regard to drainage matters and water supply in the Gold Coast District, which it was stated were in an unsatisfactory condition. Among the sources of nuisance which he mentioned as characteristic of the towns of this region was the wandering through the streets of thousands of swine. This constituted an objectionable feature, and was a continuous source of nuisance.

Mr. Kaye Parry then read a paper on the "Progress in Sewage Purification," which we shall give next week.

The Hygienic Aspects of Street-Making.

Mr. Edward Glover next read a paper on "The Hygienic Aspects of Street-Making," and said that properly constructed street surfaces were a large factor in the public health. In the course of the paper the author said: "In slums we find 'matter out of place' in all degrees of saturation, age, and pulverisation. In most of the ancient laneways we travel as on a switchback over various catchment areas and land-locked lakelets unable to discharge themselves into some misplaced lazy gulley, which, like a tank overflow, rises high and dry above water level. In places not under charge of the Corporation or other authority we find the slums repeated, while as regards the new streets or roads of enterprising builders many of them are only jerry-made, mere 'dirt' roads, which must involve reconstruction in the future. No private owner should be allowed to make a street and then hand it over to a public authority. The authority should do the work and the cost be assessed on the proper area or individuals. Streets serve as open spaces as well as for lines of communication, and, in the case of new ones, their location, alignment, and minimum width, should be carefully considered. . . . From the traffic point of view the travelling surface of a street should be as clean and smooth as possible. Omitting altogether the kind of materials used in forming a surface it is therefore evident that (1) it should be impossible for water to lodge on the top or at the bottom of the crust, and (2) the crust should be water-tight and of sufficient strength. Street surfaces not kept clean, or which hold lodgments of even clean water, wear away very quickly under traffic, while any crust which allows water to leak through becomes bumpy, irregular, and uneven, in spite of the greatest care in maintenance. Water close underneath the crust is, as a general rule, a greater enemy to a road surface than water lodging on top. . . . In producing and maintaining a proper carriage-way along our streets, we easily see that the requirements for health and traffic are the same. Surface cleanliness is necessary for both, and it is hard to say whether scavenging conduces more to longevity for human life or road life. The same may be said in relation to ground water level in the subsoil. It is known how great a factor the soil is in the spread of many diseases, and nothing influences the ground in this way more than water. So, too, a wet subsoil makes a good street surface impossible. Although a certain amount of moisture is necessary for street surfaces, yet over 90 per cent. of their wear and tear are due to the influence of water. I do not know if street-making and maintenance are included in the curriculum for sanitary or health officers—if not, they should be, and with as much reason as ventilation, light, and allied subjects. Drainage for the efficiency and conservation of a street surface, of whatever materials constructed, must not only prevent water lodging, but also make it flow off quickly. Surface water must be compelled to remove itself automatically by proper grading and levels into gulleys in the water tables or side channels. Even upon the flattest ground there need be no difficulty in obtaining the necessary falls cross and longitudinal, because they can be worked out of the thickness of the crust itself. To prevent too much winding or distortion of the surface, and too great a height of footpath kerbing, the position and number of the gulleys require accurate consideration. As regards subsoil drainage, we have to consider it in two aspects—(1) as regards water coming from an area outside the ground covered by the street, and (2) as regards local water percolating down through a leaky crust. In the former case the water to travel laterally underground must be under pressure as coming from higher ground, or else the street must be over or upon an underground basin whose lowest point of discharge is too high. Ordinary intercepting drains outside the street area, or lowering the overflow of the basin, will prevent a wet sub-soil and lower the line of saturation to any required level in these cases. Secondly, as regards water percolating through a leaky crust, we must see that intercepting drains or lowering an overflow will not cure it. Of course, frequent minor intermediate drains would tend towards a cure, but they are practically impossible in street work. Local water travels at a very small lateral angle, and it is therefore hard to catch it. There can be no doubt that local water leaking into the soil is the chief factor in raising the 'ground water level' in most places. Water-tight street surfaces would prevent much mischief considering how large is the area of a town which its streets occupy. All houses should have eaves' gutters discharging into drains; and footpaths should have a good fall to the channels, and be water-tight also. These necessities are evident if we examine the weeping and damp-sodden walls of basements and areas, which are only too common. I have two cases in my mind where basements become unusable from water oozing through the walls from near ceiling level to the floor. Several remedies were tried and failed until the footpath was made water-tight, when the evil disappeared. A footpath should act as an external damp-course, extending beyond wall face at ground level to save the part below. Much could be said about the materials employed in street making, as well as their undoubted influence on public health, apart from proper workmanship. But probably it is not necessary in a general review to enter into such details. The choice of materials for any particular street is chiefly a question of first cost, and the public must be educated to pay for the proper article. In the near future, however, we may afford, at small expense, to have clean, smooth, and noiseless streets. Electricity, motor cars, and rubber tyres seem to point that way. If so, the new era will add to the span of human life."

The sitting was then suspended, the members being invited to assist at the presentation of medical honours—Honorary Fellowships of the Royal College of Physicians and Honorary Diplomas in State Medicine—to a number of distinguished members of the Congress. The Honorary Fellowship was conferred on Dr. Alexander Crum Brown, F.R.S., F.R.C.P., London; Sir Charles Cameron, M.D., F.R.C.S.I.; Dr. Mathew Hay, and Sir Richard Thorne Thorne, K.C.B., M.B., F.R.C.P., London. The Honorary Diploma was presented to Dr. T. W. Grimshaw, C.B., F.R.C.P.I.; Sir Henry Littlejohn, M.D.; Dr. John W. Moore, F.R.C.P.I.; Dr. W. R. Smith, D.Sc.; Dr. T. J. Stafford, and Dr. J. C. Thresh, M.O.H., Essex County Council.

The final sitting of the Section took place on

Tuesday morning, the previous day having been exclusively devoted to excursions to Belfast and various picturesque localities in the County of Wicklow.

Exhausting Steam, &c., from Washhouses, &c.

Mr. C. P. Cotton, who again presided, called upon Dr. McElligott to read a paper on "An Improved Method of Exhausting the Steam and Fumes from Washhouses, Sculleries, &c." Architects, he said, had adopted various devices for preventing disagreeable fumes on washing days from permeating the living rooms in dwelling houses with more or less unsuccessful results. The best device the reader of the paper had ever met with was somewhat commonly used in Lancashire and the North Midlands, and it was this method that he desired to bring before the Section. The apparatus was very effective, though it cost but a small sum, and needed no structural alterations in fixing it. A model shown had a metal base ring intended to fit over the copper, to one side of which a kind of cowl was attached, which served to direct the steam, fumes, &c., into the ordinary chimney flue in such a way that no back draught could drive the fumes again into the house. One portion of the cowl served to allow soot to fall down a vertical tube into the flue connecting the copper with the ordinary chimney. The apparatus, made in galvanised iron, might be supplied for a guinea.

The President, in thanking Dr. McElligott, described the apparatus as practical, simple, and certain.

The Septic Tank System.

A paper was subsequently read by Mr. R. H. Dorman, M.Inst.C.E., Town Surveyor, Armagh, on "Some Experiments with the Septic Tank System of Sewerage Treatment." There was a large attendance of engineering and medical experts among those taking part in the discussion which followed the reading of the paper.

Mr. Dorman, after the first publication of Mr. Donald Cameron's experiments, put up a small tank and filter bed on his own premises, and, following on Mr. Cameron's lines, he found he was able to get a clear, bright effluent. He then advised the Portadown Commissioners to construct experimental filters in connexion with an existing covered tank, and two small filters were constructed. With a filtering material only 3 ft. 3 in. deep, and with only a fall of 4 ft. between the tank overflow and the winter level of the River Corcrain into which the filtrate discharged, satisfactory results were obtained, and had continued for some time. After some early defects had been remedied, the sewage passed through the tank normally, only requiring to be regulated occasionally by the Town Sergeant. No choking had taken place recently, the action being precisely that proceeding in the tank at Exeter, and no trouble being experienced in the working of it. The sewage due to a population of about 3,000 persons passed through the tank, but the water supply being limited not more than about 18,000 gallons of sewage passed through per day. Occasionally the tank got congested, but it was easily rectified by diverting the sewage into a by-channel for a few days, when the tank returned to its normal state of activity. The filtrate was, as a rule, faintly coloured and had a slight smell on discharge. Nevertheless, the results obtained by this simple and inexpensive process were regarded as wonderful. Nearly all the solid matter in the crude sewage was thrown into solution in the septic tank and only occasional particles of solid matter were apparent to the eye as the effluent passed down the trough to the filter beds. After passing through these, all colour had almost entirely disappeared and only a few very small particles remained in the filtrate. The author of the paper was convinced by these results that if the filters at Portadown had been of the same dimensions as those at Exeter equally good results would have been obtained. They could not obtain a depth of 5 ft. at Portadown, but it was proposed to extend the number of filters by adding a series of secondary filters composed of fine clinker, and experiments already made in this direction entitled them to anticipate the best results. For the reasons stated, the filtrate at Portadown and the degree of purification there obtained would hardly compare with the results at Exeter, or with those obtainable with good chemical processes, but from these experiments the author had arrived at the following conclusions :—

1. That the cost of installation compares favourably with the cost of any other system yet known.

2. The working expenses were small, and by adopting Mr. Cameron's alternating gear they would be reduced to a minimum.

3. No sludge is left to be dealt with, and the small quantity of deposit that accumulated at the bottom of the tank only needed to be removed about once in twelve months.

4. There appeared to be no secondary decomposition set up after the filtrate was discharged into the river.

It was, the lecturer thought, difficult to decide between the septic tank system and the Sutton (Dibdin's) process for dealing with sewage, but for the treatment of ordinary domestic sewage, or that from any district, not overloaded with chemicals, he knew of no system of chemical treatment yet applied which would compare favourably with this and one or two other biological processes. Some forms of sewage might, perhaps, be too strong for the organisms found in the septic tank to deal with. The author had had no practical experience with the septic treatment of sewage overloaded with chemicals, such as that resulting from Manchester, Wolverhampton, Wednesbury, and similar places, and he would like to hear an expression of opinion from any one who had tried to treat sewage of this character by this or the Sutton process. But it appeared to him that as Mr. D. Cameron availed himself to the fullest extent of the an-ærobic as well as of the ærobic micro-organisms, he had more power at his disposal than was obtained by the Sutton process.

Dr. Kaye Parry, in the discussion which followed, said it was claimed for the septic tank that there was no sludge formed in it. To him the difficulty was that more than half the solid matter found in sewage was inorganic, upon which an-ærobic organisms could have no appreciable effect. If this matter was all liquefied the question of sewage treatment was solved, but, if not, they would have a deposit in the least convenient form for collection. The Dortmund tank was more convenient and it worked in the opposite direction.

Dr. Collison, Kingston-on-Thames, said they had at Kingston the A.B.C. process, but the demands of the Thames Conservancy Board made it necessary to seek some improved system. He had, therefore, visited Exeter with the object of verifying the claims made for the septic tank process. A key was given to him which enabled him to go in and out of the works when he liked, and he took samples at various times as he wished. He brought away many bottles of the filtrate, and after keeping them in his room a fortnight, he poured into two long glasses an equal quantity in each of the filtrate and water of the Lambeth Water Company, and only one member of the Committee was able to tell which was which. He had also visited Yeovil, where dye and tan works produced a very foul sewage. He found the effluent there as pure as at Exeter.

Professor McWeeney asked if the septic tank had been tried with concentrated sewage, and by what means the stench was to be obviated. Dr. McWeeney expressed strong doubts whether in many cases the sewage would not be found too strong for the organisms to break down.

Dr. Woodman, M.O.H., Exeter, replying to these points, said he had never experienced any smell at the works except a slight odour of a musty kind at the entrance. The filtrate was always pure and clear like good water. He had no interest in the process, but he believed that when any other system was tried against Cameron's it would be found wanting.

Sir Charles Cameron said it had of late become evident that the bacteriologist was now as necessary as the sanitary engineer in the proper examination of sewers, and at Manchester, Liverpool, and other places the Authorities had appointed bacteriologists under the title of public analysts. Although this title might be rather a misnomer, he would suggest to the section the desirability of passing a resolution which would be considered at the final general meeting of the Congress, recommending Authorities, when appointing public analysts, to appoint bacteriologists. This suggestion was adopted, and a resolution in accordance with it was carried unanimously before the conclusion of the sitting.

Mr. Donald Cameron (Exeter) in resuming the discussion, said it must be evident that there existed some force in nature which dealt with dead organic matter. One thing had been established—that domestic sewage could be dealt with without chemicals or other artificial treatment, and that it could be treated at a lower rate for first cost and for maintenance than any chemical system with which he was acquainted. It dealt successfully with weak sewage from midden towns and strong sewage from towns and the foulest sewage in England; that of Yeovil had been effectively treated and purified by it in a natural method. He would not say there was no deposit, but in two years at Exeter there had not been any occasion to take anything out. With regard to smell, the sewage works were within from ten to twenty yards from a public highway, and people passed without knowing of the existence of the works. His first object was to let everything get into the tank, and his next to construct works that would practically take care of themselves. They only required the attendance of a man for a short time every third day to change the floaters.

Mr. Alderman Gibbons (Wolverhampton) asked whether at Exeter the drainage was upon the separate or the combined system? What effect a storm would produce, and whether the system could be applied to very strong sewage such as they had at Birmingham and Wolverhampton?

Mr. Cameron, in reply, said the combined system was in use at Exeter. The engineer's difficulties were chiefly due to storm water and rain water, and he would find the septic tank a boon, because the septic tank was better prepared to deal with storm water than other systems, which had the disadvantage of causing capital to be locked up for indefinite periods. In order to be prepared to deal with a sudden accession of volume due to a storm, it was necessary to construct their works of an extra capacity, and thus much capital was locked up until a storm came on. That was not the case with the septic tank; and he would like an expression of opinion from any engineer present upon that point.

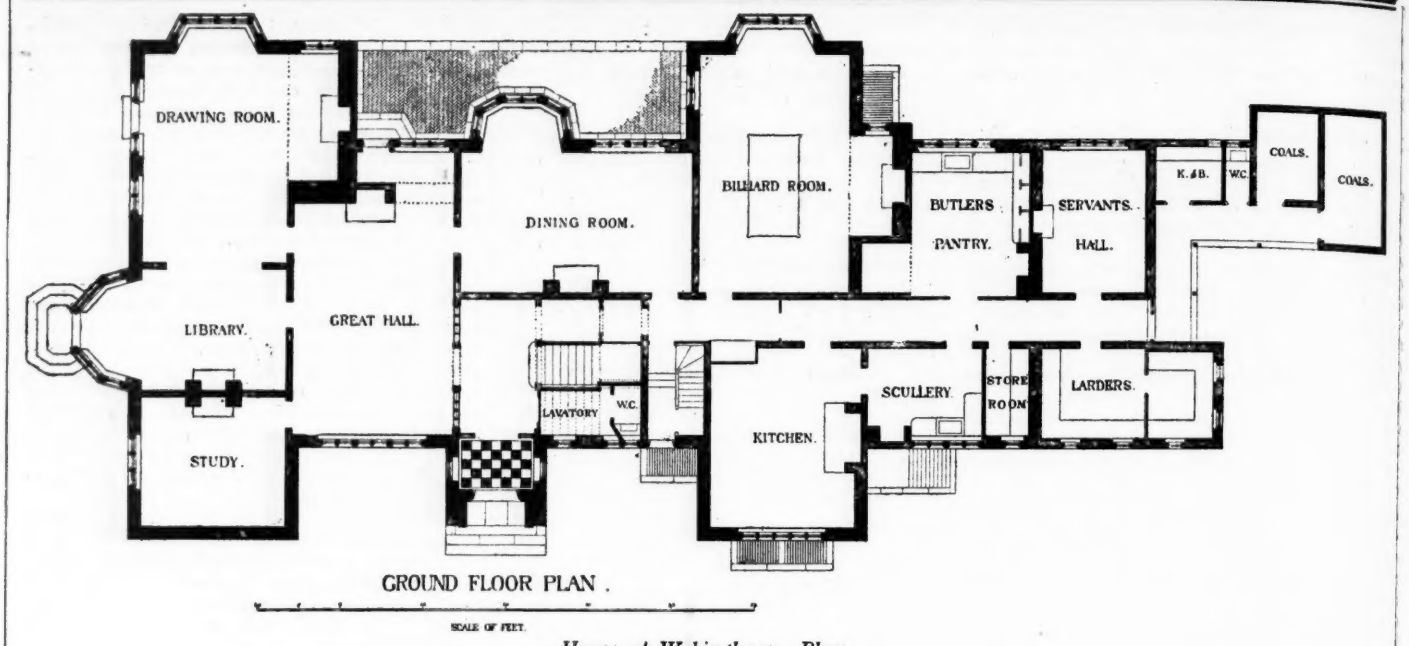
Mr. Kirby, Engineer, of Newport, Monmouth, thought that as engineers they ought to stand up for a simple system like that described, because it spared them the necessity of studying and criticising a great many scientific matters that they did not want to go into. If the engineer could get an effluent like that which had been laid on the table, that was all he wanted. It was, of course, very interesting to get from the bacteriologist a scientific explanation of all the natural phenomena that are involved in chemical or biological changes, but results were what the engineer wanted. The inquiry which had been officially conducted with regard to the works at Exeter had been most searching—he thought it would not have been possible to have had one more searching—and after it, Professor Dupré, Mr. Dibdin, and other experts had all recognised the merits of the system. Professor Dupré, who at first appeared to doubt the reality of such incredible results, at length declared that the results were so excellent that to extend them by applying the effluent to land would deteriorate instead of improving the effluent.

In closing the discussion the President said very briefly that he could only express the very great interest with which he had listened to the paper and the discussion, and they were greatly indebted to the author of the paper and to Mr. Donald Cameron, the inventor of the septic tank system, for his explanations.

The time having now arrived for the closing general meeting of the congress, a paper on "The Laying and Jointing of Sewer Pipes," by Mr. R. H. Dorman, surveyor, Armagh, had been turned over to the Conference of Sanitary Inspectors, and two other papers were left unconsidered, viz., "Sanitary Work of the Romans in Lincoln," by Dr. Wm. O'Neill, M.R.C.P., London, &c., and "Notes on the Design and Erection of Architectural Ironwork," by Mr. H. A. Cutler, City Engineer, Cork.

Sanitary Inspectors' Conference.

At the first sitting, held on the 19th inst., of the Conference, before the President Elect, Mr. Kenneth Cameron, Chief Sanitary Inspector, Aberdeen, delivered his inaugural address, a paper was read by Mr. M'Mahon, Torquay, on "The Training of Sanitary Officers." Most authorities would now demand, he thought, at least the certificate of the Sanitary Institute before appointing a sanitary inspector who was required to give his whole time to the duties of his office. That, he



House at Wokingham. Plan.

considered, was not enough, because without the possession of any practical knowledge whatever, an intelligent man might be coached in a few months to pass the certificate examination. The multifarious duties a sanitary officer was now called upon to perform required at the minimum a practical knowledge of building construction and materials, the quality and characteristics of genuine and adulterated articles of food, with a knowledge of plan drawing and land surveying. As the best means of acquiring this special practical training the author recommended the adoption of the principle of articling pupils for a term of two years to a sanitary officer of standing. During his apprenticeship he must study the Public Health Acts and the other statutes bearing upon his duties, and at the later stage must visit with his instructor premises to be condemned or approved in order to acquire a knowledge of work and materials, and of the method of dealing with skilled and unskilled craftsmen. His course of theoretical study must be directed towards passing the certificate examination, but the knowledge thus acquired would not be mere cram, but valuable, practical wisdom, of just the right kind.

Mr. Cameron then delivered his presidential address. He described the constitution of the Sanitary Inspectors' Association of Scotland, which was formed in 1891 of ordinary and honorary members as in the elder Association formed in London. Among the chief needs of sanitary officers he enumerated practical instruction, followed by examination by some central body whose certificate of competency would be recognised and accepted by everybody. A reasonable tenure of office was necessary, for without it inspectors could not always perform their duties without fear or favour. In Scotland they had got beyond this, the need for security of tenure having been recognised by statute. Why it should not be so in England and Ireland he knew not, but hoped these officers would not rest until their claims had been recognised, as in Scotland. The progress in sanitation in Scotland during the past half century was traced until to-day, the President affirmed. In Scotland, at least, the work of the sanitary inspector was better understood and appreciated than ever before, and as a consequence many of the earlier causes of misunderstanding among the various classes had now disappeared. While Ireland still held the palm in the matter of favourable death-rate, that of Scotland had fallen from 22·3 to 19 per 1,000, a reduction of 3·3. The practical meaning of these figures was that an annual saving of life took place in Scotland alone of 13,715 persons. The Local Government Act, 1889, had effected a perfect revolution in rural districts, and by the aid of the Public Health (Scotland) Act, 1897, they hoped to carry out the good work in large cities and towns with still greater vigour and success. Among the subjects discussed on the opening day and on Saturday were "The Sale of Food and Drugs Act," by Mr. Jno. Sumner, chief sanitary inspector, Wigan, "The Necessity for Amending the Law with regard to Sewers and Drains," by Sir Charles Cameron, "The Housing of the Poor," by Dr. Antony Roche, and at the closing sitting on Tuesday, "The Laying and Jointing of Pipe Sewers," by Mr. R. H. Dorman, surveyor, Armagh.

Illustrations.

HOUSE AT WOKINGHAM.

THIS house, the view of which was exhibited at the Royal Academy of this year, is built of red bricks and stone, with red tiles and a wooden cornice. Large cast-lead gutters form the finish to the stone bays.

The staircase and screens are of mahogany slightly inlaid with ebony and holly; and the staircase and halls are panelled with deal.

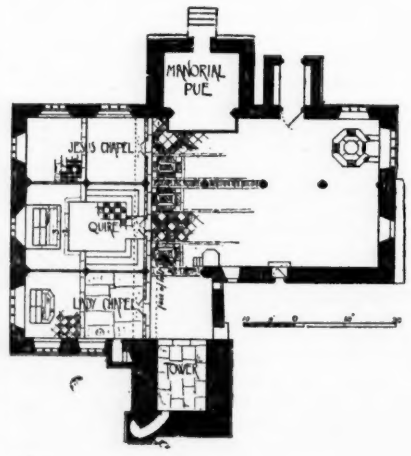
The builders are Messrs. Bottrill & Son, of Reading; the heating work is by Messrs. Longden, of London; and the glazing and casements, and also the cast-lead work, by Messrs. Wenham & Waters, of Croydon.

Mr. Ernest Newton is the architect.

NEW ROOD SCREEN, BLISLAND.

THIS church is situated near the border of the Bodmin Moors, at the head of a beautiful valley.

The plan is a variation of the usual Cornish type; and the roofs are of the local waggon



Blisland Church. Plan.

form, but with beautifully carved ribs and purlins. The church retains no ancient furniture.

On the columns at the entrance to the chancel were two curious corbels, the position of which determined the level of the loft; and marks were found on the mouldings of the arches which gave the height of the loft front. The new screen, while it followed these indications, does not pretend to be in any sense a "restoration." F. C. EDEN.

HOUSE AT MILFORD.

THIS house, called "Westover House," is on the south coast of Hampshire, overlooking the Solent and the Needles. It is built of red brick, with stonework of a rich yellow colour, and dark-coloured tiling. The internal joinery and panelling is of varnished oak throughout.

Messrs. John Parnell & Son of Rugby are the contractors, and Mr. Arnold Mitchell the architect.

COTTAGE AT RICKMANSWORTH.

MR. ARNOLD MITCHELL is also the architect of this cottage, which has been built by Mr. Charles Brightman, of Watford, the materials used being brick and tiles.

HILL HOUSE, HAMPSTEAD.

THIS house, situated in one of the finest positions on the Heath, has been very considerably altered and enlarged for Mr. Geo. Fisher. The view we publish is the new garden front, commanding a very fine and extensive view westward. The walls of the old house were retained as far as possible, and rough-cast externally on the ground floor; the upper part being tile-hung. The contractor was Mr. A. Wallis, of Balham, and the architects Messrs. J. T. Wimperis & Arber.

DESIGN FOR A SMALL COUNTRY HOUSE AND GARDEN.

We have received no information in regard to this design from the author, Mr. R. Shekleton Balfour; probably because, like many other Londoners, he is out of town at present. The design, however, speaks for itself; it is a half-timber cottage with a formal garden in front.

In the plan the dining-room, which in a house of this size would be also the morning-room, faces the east, and the drawing-room the west; avoiding the mistake so often made in cottage plans of placing drawing-room and dining-room together and facing the same way. The smoking-room is nearer the drawing-room than is usual, but the doors are not contiguous, and there is no practical objection to the position.

As a matter of design, our opinion would be that where the garden is so absolutely symmetrical and central in design, the house front which faces it should also be symmetrical. The *raison d'être* of the formal garden is that it combines with and forms a part of the design of the house, which can hardly be said to be the case here.

LONDON AND JOINT-STOCK BANK, WOOD-STREET.—The new branch premises, which stand on the site of St. Michael's Church, along the side of Huggin-lane, are nearly completed. Messrs. Davis & Emanuel are the architects; the contractors are Messrs. Ashby & Horner, of Aldgate.

Hill House, Hampstead. Plans.

THE ARCHITECTURAL ASSOCIATION:

VISIT TO ARNO'S GROVE.

ON Saturday, August 20, a party of members of the Architectural Association visited Arno's Grove, an early Georgian house, near Palmer's Green Station, Great Northern Railway, originally designed by Sir Robert Taylor in 1720 to 1723. Permission to see the house was kindly granted by Mr. V. E. Walker, the owner, and the party was conducted by Mr. William White, the architect who is carrying out alterations and repairs to the building. These have had to be very extensive owing to the serious settlements which had taken place, and also owing to the bad construction by the original builder.

The chief points of interest about the house as originally built are the simple and severe proportions of the mass, consisting as it did of an unbroken rectangular block in the centre, rising to three stories, flanked by a lower wing at either end. The east or entrance front had a central door and rectangular openings filled with sash windows in the central block, while two large Venetian windows occupied the wings. The west front was entirely lit by rectangular openings filled with sashed windows and relieved by a central semicircular bay on the ground floor only. The north end of the house, being a blank wall, was screened by a graceful Classic portico with fluted columns of wood on stone bases, forming a sort of summer house. The back wall of this is embellished with sash windows with the familiar heavy sash bars, but these windows were inserted purely for ornament and they do not light the rooms behind them. Over these are niches containing busts.

In the interior the chief feature is the fine staircase entrance hall. This is open to the level of the first-floor ceiling, and its walls and ceiling are painted with allegorical subjects in the style prevalent at the date of the building of the house. The hall is 34 ft. by 28 ft., by 24 ft. high. The staircase is of oak, with twisted balusters and ramped handrail, and open strings with carved spandrel ends to the steps.

Between the dining and drawing rooms is a pleasing little alcove with plaster coved ceiling ornamented by interlacing ribs closely set into a sort of basket-work pattern. The alcove is open to the dining-room, being separated from it by a pair of fluted Ionic columns, and has a door from it leading to the drawing-room.

The alterations carried out by Mr. White have been, besides rebuilding a large part of the outer walls and generally making the main structure sound, the following:—All the sash windows, except those on the top floor and the sham ones in the north portico, have been taken out owing to their decayed state, and have been replaced with large oak double hung casements, with transom above, and filled with large sheets of plate glass. The oak frames are oiled and varnished. The same has been done to the two large Venetian windows. A block of building has been raised over part of the south wing, very much destroying the original mass design. A large and heavy portico has been built to shelter the entrance door. This consists of a flight of steps forming a base, and covered with a flat-roofed porch, rectangular on plan, and enclosed with heavy Corinthian columns. The shafts of these are of a red stone, and the caps, bases, and entablature of Weldon stone. The roof is of Hayward's glass prism pavement lights.

Inside the house the staircase has been altered by taking three steps off the top flight and adding them to the lowest flight in order to get more head-room in the passage from the hall to the dining-room. The effect of this is to raise the outer hand-rail about twelve or more inches above the wall or dado-rail, as the latter could not be raised without covering the lower part of the wall-painting. The whole of the newels are new, and a series of coupled balusters has been inserted to add strength to the balustrade. The well-string has been carved. All the carving of these new parts is of the character much in vogue among the later Mediæval revivalists about twenty-five years ago. In addition to this, all the old varnish or beeswax has been scraped off or otherwise removed, and the whole, now a light brown, is freshly varnished or French polished. The handsome old oak doors have been treated in a similar manner.

In a room on the east front the old large deal panels have been divided up with new intermediate rails and styles, because they were in an unsound condition, thus changing completely the character of the panelling.

The plaster covings of the alcove in the dining-room have been painted, and now have a glossy surface; the Ionic fluted columns, formerly white painted, are being scraped and varnished, as also are all the other pilasters corresponding in that room.

New beams have been placed across the dining-room ceiling intersecting each other, and the plaster finishings to them and the walls are being picked out in colour on the white. In the library adjoining some of the entablatures of the wall decoration have been cut away and altered, together with the window alteration, in order to let more light into the room, as explained by Mr. White.

All the practical arrangements of the house have been very much improved and put into order, a task which must have caused the architect very great labour.

The members of the Association owe Mr. White their hearty thanks for the paper he kindly read to them explaining the works, and for his courtesy in showing them the house; but while it is evident that much labour and care has been bestowed on the house in putting it into a thoroughly efficient state of repair, it would be insincere to state that Mr. White's treatment of it from the æsthetic standpoint met with any great degree of approval.

W. B. H.

SCOTTISH PLUMBERS' CONGRESS IN GLASGOW.

THE ninth annual Scottish Congress of the Association for the National Registration of Plumbers opened in Glasgow on Thursday last week, and its proceedings extended over Friday and Saturday. The delegates, who numbered about 300, comprised representatives of employers and employed in the plumbing trade, as well as many members of municipalities and other public men interested in sanitary science. The opening proceedings took place in the Corporation Galleries, Sauchiehall-street, where, in the absence of Lord Provost Richmond and Bailie Murray, the senior magistrate, Bailie Dick welcomed the delegates on behalf of Glasgow Town Council, expressed his own and the municipality's sense of the value of the Congress in aiding sanitary progress, and hoped that the deliberations would be beneficial. He then moved that the chair be taken by ex-Bailie Crawford—a proposal which was accordingly adopted.

Sir Robert Pullar, in moving a vote of thanks to the Corporation for its reception, alluded to the progress which Glasgow had made in sanitary science.

The vote of thanks to the Corporation was cordially passed, and was acknowledged by Bailie Dick.

The President then delivered his address. He remarked at the outset that Glasgow was a very good place for the Congress to visit, because it had been from the first active in regard to plumbers' registration, had kept a keen eye on the plumbers themselves, and was far advanced in sanitary reform. The registration movement, he believed, was practically one to constitute the responsibility of the plumber between the two ends at which local authorities acted in relation to the water supply of a great city. Mr. Crawford went on to sketch the origin and progress of the movement for the registration of plumbers, and to describe the system by which it is promoted. He deplored that Parliament had not yet been able to give the effect of law to the Plumbers' Registration Bill. That Bill had for its object the permanent constitution of the movement, to fix a working organisation, to legalise by statute the use of the diploma and title conferred by registration, and to give powers of discipline in the case of those who commit acts unworthy of the craft.

On the motion of Mr. Cameron Corbett, M.P., the President was thanked for his address.

Bailie Dick, in the course of an address, warmly commended the registration movement. If its purpose had been merely to make additional profits for the employers or larger wages for the operatives he would have had nothing to do with it, but its purpose being to secure healthy homes, which alone could make a happy people, they had abundant reason to join in pushing forward the movement. He also commended the District Councils in their efforts to provide technical education, so that

the members of the trades might be in a fit state to claim registration by legislative enactment.

The Congress thereafter proceeded "to consider what means can be taken to secure the early passing of the Plumbers' Registration Bill into law." In the course of the discussion Mr. Galloway remarked that the first thing to be done was to improve the procedure of the House of Commons. Mr. Lees Knowles suggested that a deputation should wait on the various Local Government Boards, and thereafter on the Prime Minister. Personal interviews had more weight than petitions, and if it were pointed out that the Bill had been three times read a second time—the principle thus being affirmed—the measure might be adopted by the Government.

Mr. J. G. A. Baird, M.P., concurred in that suggestion, and said pressure might be brought to bear through the Worshipful Company of Plumbers.

The Congress then adopted a resolution renewing its approval of legislative sanction being given to the Registration movement; recognising that an effort should be made to induce the Government to adopt the Bill, and calling upon the Scottish District Councils to take prompt and energetic action for the same object, particularly by enlisting the co-operation of the local members of Parliament.

The Congress then adjourned, and resumed its sittings on Friday and Saturday, and dealt with questions of education, examination, and registration.

In connexion with the Congress an exhibition of plumbers' work and appliances was held, the arrangements being in charge of a special committee of which Mr. James Anderson, of Messrs. Ingleton & Co., was convener. The exhibition consisted of three main divisions—sanitary goods and appliances exhibited by manufacturers; specimens of modern plumbing work made by journeymen and apprentices; and of specimens of ancient and defective plumbing work taken from old buildings and the like. In order to give a fair chance to the various competitors the plumbing work was divided into four sections, viz.: The work of apprentices who have not been four years at the trade; that of apprentices over that time; that of journeymen, and tools and appliances, and lead burning. Amongst the specimens of plumber work general notice was attracted by a magnificent clock tower, standing about 12 ft. high, with the arms of the Worshipful Company of Plumbers wrought in lead, an imitation of an ancient battlemented wall with lead roof and turret, finials, rain-water heads, specimens of pipe-bending and jointing, and pipes showing proper arrangements for ventilating sanitary apparatus; also specimens of various designs of lead roofing, lead bossing, &c.

Mr. Crawford presided at the opening ceremony, which was performed by Professor M'Kendrick.

ENGINEERING SOCIETIES.

Association of Municipal and County Engineers.—The twenty-sixth voluntary pass examination for candidates for the offices of engineer and surveyor to Municipal Corporations and District Councils will be held at the Technical School, Princess-street, Manchester, on Friday and Saturday, September 30 and October 1, 1898. Application forms duly filled in by intending candidates, together with entrance fee of 2*l.* 2s., must be in the hands of the Secretary (11, Victoria-street, Westminster) on or before September 5.

BOOKS RECEIVED.

Sanitary Institute: List of exhibits to which medals have been awarded (Offices of the Sanitary Institute).

Hurst's Architectural Surveyors' Handbook (E. & F. N. Spon).

Wireless Telegraphy. By R. Kerr. (Seeley & Co.).

Science and Art Department.—The Lords of the Committee of Council on Education have received a request, on behalf of the Hungarian Government, for a selection of works for which awards have been made in the National Competition of this year, to be sent on loan, at the expense of the Hungarian Government, for exhibition in the new Industrial Art Museum at Buda Pest, and have promised to afford every facility towards this object. The Schools of Art are being asked to state in each case whether works may be sent.

Correspondence.

To the Editor of The Builder.

STAINING, &c., RIGA OR AUSTRIAN WAINSCOT.

Sir,—Could you give me particulars as to the methods used to stain wainscot, joiners' and cabinet work?

1. Is this staining done by sealing up the work to be stained in a room, or is it done in a properly-built air-tight room, specially used for fumigating? Can the work be fixed (say if dado or staircase or doors) first, then the room properly sealed up, or fastened up a time, and then fumed?

2. How is the ammonia used and what quantity would be wanted? In what form is it used, liquid or lump?

3. Would the wainscot have the same colour if the spirit of ammonia, say 840 fort liq., was used rubbed on with a piece of rag?

4. How is wax polish made and used to obtain a dull effect? Cornwall.

*** 1. Both. The work if fixed first, and the room or staircase sealed up, gives the most satisfactory result as regards tone of colour, as the whole work has the same strength of ammonia to contend with. When a fumigating *room* is kept, work of a given size only can be put in, consequently various tones of colour are obtained.

2. In a room, say, of 20 ft. by 12 ft., dishes or soup plates would be placed on the floor and filled with liquid ammonia to the number of about ten. The room, if required as dark oak, would be sealed up for twelve hours; if the tone is required of less depth of colour, say five hours.

3. Practically yes, but the objection to this is that it raises the grain of the oak as a water stain would, and again it is very difficult to apply it.

4. Bees-wax is shaved off and dissolved in spirits of turpentine to a pulp, then applied with a stencil brush, and well rubbed into the pores of the wood, allowed to dry, and finally cleaned off with a hard hair brush. This gives an excellent polish.

APPOINTMENT OF ARCHITECT, UNION WORKHOUSE, SALFORD.

Sir,—The subject mentioned by Messrs. Worthington in the *Builder* for August 13 should not be left where it is. In the Manchester papers the following were given as those from whom the Salford Guardians would select their architect:—Messrs. J. B. Broadbent, E. Chrisfield, W. T. Gunson, Darbyshire & Smith, E. Kirby, T. Worthington, H. Lord.

If those who supported Messrs. Worthington would write to the *Builder*, we should know who the three are who did not do so. Several of the above are F.R.I.B.A.s and members of the Manchester Association of Architects. If any of them should be among the three, the sooner they are called upon to resign the better. Vitruvius.

AN OLD LONDON MAUSOLEUM.

Sir,—As you always seem interested in old buildings and their fate, could you tell me what became of a "mausoleum" built by Dr. Wm. Stukely, the celebrated antiquarian (b. 1687, d. 1765), somewhere in Kentish Town about 1763? He was not, however, buried there.

Perhaps some of your readers might know if anything of it were left. H. W. Dickinson.

The Student's Column.

SOUND, LIGHT, AND HEAT.—IX.

SOUND VIBRATIONS (*continued*).

THE vibrations in strings may be either transverse or longitudinal—transverse, for instance, when actuated by a bow being drawn across the string, and longitudinal when the latter is pulled and let go suddenly. These phenomena may best be studied by means of an instrument called a sonometer, which usually consists of a string (or strings), bridged and tightly stretched over a resonance-box, much in the same way as a violin string might be in that instrument; only, in place of the keys of the violin there is a pulley over which the string passes. The string is kept in position and tightly stretched by weights fastened below the pulley. The vibrations may be modified by increasing or decreasing the number of these weights, as well as by altering the heights and distances of the movable bridges.

In the vibrations in wind instruments the enclosed column of air is the sounding body, that is, when the sides of the tube are of adequate thickness. In reference to this part of the subject, Atkinson remarks that the substance of the tubes is without influence on the fundamental note; with equal dimensions it is the same whether the tubes are of glass, wood, or metal. These different materials simply do no more than give rise to different harmonics, and thereby impart a different quality to the compound sound produced. Vibration of air in tubes is set up either by mouth instruments or reed instruments. In the case of the former all parts of the mouth-piece are fixed, in the latter a simple elastic tongue sets the air in vibration. With organ pipes the vibrations of the air producing a musical note take place in a direction parallel to the axis of the pipe—not transversely, as in the case of the portions of a vibrating string.

In the vibration of rods the point at which the rod is clamped is a node. It is shown by calculation that the number of transverse vibrations made in a given time by rods and thin plates of the same material is directly as their thickness and inversely as the square of their length. The width of the plate does not affect the number of vibrations. A wide plate, however, requires a greater force to set it in motion than a narrow one.* As we have already seen, the velocity of sound in any solid may be determined experimentally by clamping a rod of the solid at one end and putting it in longitudinal vibration.

In the vibration of plates, these are set in motion by first clamping them or fixing them otherwise to some object, or they may be suspended; then the periphery is scraped by a bow, or the plate being perforated a string covered by resin is repeatedly and rapidly drawn through it. Or the plates may be smartly struck, as in ringing a gong. This sets up vibration, and these plates contain nodal lines, which vary in number and position according to the form of the plates, the elasticity of the latter, and the number of vibrations. The nodal lines in plates may be made visible by employing sand in the following manner: Scatter the sand indiscriminately over the horizontally-fixed plate, then vibrate the latter, when the sand will "jump" into position by accumulating along the nodal lines. The law governing the vibration of plates is stated as follows: In plates of the same kind and shape, and giving the same system of nodal lines, the number of vibrations in a second is directly as the thickness of the plates, and inversely as their area.

Membranes are used in practice for recording sound vibrations, and for kindred purposes, especially in the applications of electricity. By reason of their flexibility they cannot vibrate unless they are stretched. They are eminently fitted for taking up air vibrations.

Not only can sound be decomposed into its constituent parts—as in König's apparatus for the analysis of sound—but the results of the analysis may be verified by synthesis, as Von Helmholtz discovered. The same observer has succeeded in explaining the different timbre, or quality of sound.

In regard to the transmutation of sound-vibrations, Mr. J. Goold exhibited at a conversazione of the Royal Society in May of last year, a large steel plate, which was set in vibration by means of a synchronising generator. He demonstrated that without a resonator there is very little audible sound, but on bringing the plate into contact with a common deal board its vibration is at once transformed into a loud harmonic cord. The notes of the chord are those proper to strings. A dish of mercury placed on the nodal region of a vibrating plate exhibits a brilliant series of ripples.

It has long been known that the same form of nodal lines is always produced on the same plate under the same conditions; and we have just stated the law that in plates of the same kind and shape the same system of nodal lines is produced. From this it follows that plates of different composition must yield different patterns of nodal lines. This circumstance, though not yet much taken advantage of, may be utilised in testing plates for practical purposes, *i.e.*, their composition, structure, and quality. Such vibration figures could readily indicate when an alloy of a substance had been properly prepared; they could be made to show the positions of cracks and flaws in plates, or local disease in old plates acted upon by weathering; fatigue in steel plates ought to be detected with facility in the same way, and there are many other practical applications of nodal lines and points. A new synchronising sound generator, invented by Mr. Goold, con-

* Ganot's "Physics," 1893, p. 261.

sists of a vibrating rubber having the pitch or vibration period of the note to be elicited. By this means the separate partial tones may be developed singly. This appliance led to the further discovery of vibration axes and vibration vortices.

Compound vibration figures may be readily produced by a method also devised by the last-mentioned observer. Sound curves are the forms produced by combining the motions of two or more simple vibrations in one resultant motion. In order to trace the form corresponding to the compounded vibrations of any ratio it is only necessary to copy the motion of a heavy weight moving, in harmonic vibrations of the required ratio, at any convenient rate. This is the method adopted by Mr. Goold: A heavy iron plate carrying the tracing paper moves slowly through the compound form, and its motion is copied by means of a fine glass pen, which is so fixed that its point falls lightly on the paper surface, yielding readily to slight alterations of level, but laterally it is immovable. In this curve-tracing pendulum sound-motion is slow enough to be visible, but too slow to be audible; such "inaudible sound" has its analogue in invisible light—as, for instance, in the ultra-red and ultra-violet portions of the spectrum, and as demonstrated by photography. Its compound forms are necessarily identical with the motion-forms of audibly sonorous particles, compounded from vibrations bearing similar ratios, because pendulums and particles are governed by the same laws; whilst, for plane curves, the natural elasticity of the particle corresponds precisely to the balanced forces that serve to bring the pendulum mass to its resting-place. By means of the pendulum the peculiar forms proper to a vast variety of combined vibrations may be traced. Sound curves may be divided into two groups—single vibration curves and unison curves. Single-vibration curves of the simplest ratios, including two vibrations only, are known as Lissajous' figures; the ellipse and figure of 8 may be cited as examples corresponding to the unison and octave respectively. Unison-curves are figures resulting from the combination of two or more ellipses in one complex motion. These figures, as demonstrated by the last mentioned scientist, are vastly more comprehensive and more generally representative of common facts than single-vibration curves, because the ellipse is the resultant not only of two isochronous vibrations at right angles, but is equally the resultant of any number of isochronous vibrations at all angles. Inasmuch as sound is motion, it will be readily understood that sound-curves are also force-curves.

The vibratory motion of bodies may be rendered apparent by Lissajous' method either directly or by projection on a screen. This method depends on the persistence of visual sensations on the retina, and consists in fixing a small mirror on the vibrating body so as to vibrate with it and impart to a luminous ray a vibratory motion similar to its own; tuning forks are commonly employed for the purpose. Léon Scott's phonautograph registers not only the vibrations produced by solid bodies, but by any noise whatever. Another direct method is that devised by König, which consists in transmitting the motion of sound waves to gas flames, which by their flickering (or pulsations) indicate the nature of the sounds.

We have already alluded to several practical advantages derived from a knowledge of sound vibrations, and we know that the phenomenon occurs in practically all things. Masses vibrate on the large scale as well as on a small one—the pillars and walls of a church vibrate more or less when the church bells are being rung, the sound of great ordnance causes whole buildings to vibrate even at some distance, whilst thunder "shakes the hills to their very foundation." On the other hand, sounds of less intensity are recorded by vibrations on highly sensitive "membranes," as in such instruments as the telephone and phonograph.

VICARAGE, GOBOWEN, SALOP. — The foundation stone has just been laid of the new Vicarage for the ecclesiastical parish of Hengoed and Gobowen. The plans for the house, which is on the main road on the Oswestry side of Gobowen, were prepared by Messrs. Shayler & Madoc Jones, architects, Oswestry, and the contractor is Mr. W. Felton, Oswestry. The cost of the building is estimated at 1,500*l.*

PROPOSED NEW HOTEL, LOWESTOFT. — Plans of the new hotel Messrs. Spiers & Pond propose erecting on Kirkley Cliff have been prepared. The architects are Messrs. L. H. Isaacs & H. L. Florence, of London.

GENERAL BUILDING NEWS.

CHURCH OF ST. AGATHA, SPARKBROOK, WORCESTERSHIRE.—The west front of this church, in Stratford-road, is to consist of a tower, flanked by deeply recessed entrance porches. Under the tower the baptistry is situated, and the adjoining porches are cloak rooms. There is a nave, and side aisles of six bays, and a third porch at the east end of the church. The chancel contains three bays. The choir transept is on the north side of the chancel, with organ chamber over. The choir and clergy vestries are on the south side. Accommodation is provided for 1,000 sittings, and the building is estimated to cost 10,000*l.* The architect is Mr. W. H. Bidlake, Birmingham.

CATHOLIC CHURCH, GILLINGHAM, NORFOLK.—A portion of the new Catholic Mission Church of "Our Lady of Perpetual Succour" at Gillingham, was opened on the 18th inst. The church has been built by Mr. F. R. Allen's executors, of Beccles, from plans prepared by Mr. R. Banham, Mayor of Beccles. It is of red brick, with a sanctuary, and five bays to the nave. When it is completed there will be seven bays. The nave is 40 ft. long by 18 ft. wide, and the circular sanctuary is 20 ft. by 18 ft.

CHURCH EXTENSION, HOLBROOK, SHEFFIELD.—The foundation-stone of a church mission-room has just been laid at Holbrook. The plans for the building were prepared by Mr. J. D. Webster, architect, of Sheffield, and the contract given to Messrs. Kirkby & Drabble.

CHURCH, HERNE BAY.—The foundation-stone of the new Church of St. John the Evangelist, Herne Bay, has just been laid by the Lord Mayor of London. The church will occupy a site in Brunswick-square. It will cost about 8,000*l.* when completed, the portion now being undertaken consisting of the nave and aisles. It has been designed by the Diocesan Architect, Mr. R. P. Day.

RE-OPENING OF ROLLESTON CHURCH, NOTTS.—The church at Rolleston has just been re-opened after restoration. Mr. Hodgson Fowler was the architect.

RENOVATION OF AULDEARN PARISH CHURCH, NAIRN.—The interior of Auldearn Parish Church is now being renovated under the direction of Mr. John Robertson, architect, Inverness. The building is to be arranged to accommodate about 350 sitters.

REOPENING OF C.U. CHURCH, COUPAR ANGUS.—This church has just been reopened after alteration. Externally the appearance of the church is little altered. The walls have been re-pointed, and the roof slates renewed. The doorway has been changed in design, and several additional windows let into the walls. Internally the old galleries have disappeared, only one remaining at the south end of the church. The pulpit is placed at the north end on a platform, round which the choir will be seated. All the woodwork is in pitch pine, stained and varnished. Heating apparatus on the high-pressure system has been fitted in. Under the gallery a vestry and session-house have been arranged. The church is seated to accommodate close on 300. The following were the tradesmen engaged:—James Bruce, mason; John Adam, joiner; Peter Donaldson, plasterer; John Doig, plumber and gasfitter; William Gilzean & Son, painters. The plans were prepared by, and the work carried out under the superintendence of, Messrs. C. and L. Ower, architects, Dundee.

WESLEYAN CHAPEL, NUNHEAD.—A new chapel is being built at Nunhead from plans prepared by Mr. Charles Bell, of Cannon-street, E C. The contractors are Messrs. Battley, Sons, & Holness. The chapel will seat 700, and will cost 6,400*l.*

PRIMITIVE METHODIST CHURCH, NEW INVENTION, STAFFORD.—A new Primitive Methodist Church is being erected at New Invention to seat 200 persons. Messrs. Johnson & Baxter, of Willenhall, are the architects, and Mr. S. Wootton, of Bloxwich, is the builder.

BAPTIST CHAPEL, BEXHILL.—A new building for the Baptists has just been opened at Bexhill. The school chapel, which was opened in December, 1896, comprises a hall 40 ft. by 26 ft. 6 in., with two vestries, about 18 ft. by 9 ft. 6 in., which open into it by revolving shutters. The new chapel is of similar style to the school—viz., fourteenth century Gothic. The inside dimensions are 60 ft. by 36 ft. 6 in., with double transepts, 20 ft. by 7 ft. At the northern end is a gallery. There are two principal entrances to the chapel—one in the tower, and one in front of the building, opening into vestibules and inner lobbies. In the space between the school and the chapel are an infants'-room and an additional class-room. The chapel floor has an incline towards the rostrum. At the rear of the rostrum is a recess 6 ft. by 15 ft., and a screen. The roof is open timbered. At the northern end of the structure is a large two-light cathedral window, all the windows being glazed with tinted glass in leaded lights. The roof is covered with Broseley tiles, while that of the tower has a covering of oak shingles. The building has been erected by Mr. Charles Thomas; the architect being Mr. R. W. Moore, of Brighton.

STEPHENSON MEMORIAL HALL, CHESTERFIELD.—The Stephenson Memorial Hall, Chesterfield, has just been re-opened after alterations and additions, involving an expenditure of about 4,000*l.* On the acquired ground at the end of the hall a stage has been built. It is 48 ft. wide and 45 ft. 8 in. from front to back. The stage has doors direct both from Corporation-street and Station Back-lane. Six new dressing rooms have been built alongside the stage and fronting Corporation-street. The entrances have been entirely re-arranged. On the Corporation-street front the front entrance way has been retained, but there are three additional entrances and exits to the hall and gallery on this side. The principal entrance has four folding outer doors, which open into a lobby enclosed with a stained glass screen; and swinging lobby doors open into a crush-room about 40 ft. by 10 ft. There is also a special entrance and exit door at the far end of this crush-room, next the dressing-rooms, leading direct to Corporation-street, and also communicating with the dressing-room and stage corridor. From the crush-room there are doors to the orchestra stalls and pit stalls, and also a staircase leading to the circle seats in the gallery. There is also cloak-room and lavatory accommodation to the crush-room. The pit and gallery are each served by separate entrances from Corporation-street. The doors to the pit open direct into a corridor leading to the back of the hall. Next to the pit door is the door from Corporation-street opening at the foot of a separate staircase leading direct to the gallery. In Station Back-lane are special exit doors both to the hall and gallery, each separate from the other. The staircases have been constructed in stone, with landings to each flight. The public hall has now a floor-space of 68 ft. by 46 ft. 6 in. The orchestra stalls accommodate 168 seats, the pit stalls 380 seats, and the pit 260 seats. The heating, ventilation, and lighting have been revised. The heating is by hot water. The decoration of the hall has been carried out by Messrs. Eyre & Sons, Limited, Chesterfield. The contractor for the alterations is Mr. John Wright, Chesterfield, and the sub-contracts have been executed by the following: Mr. J. H. Morewood, carpenter and joiner's work and stage building; Mr. W. Watson, slating; Mr. F. Hill, plastering; Messrs. Blake Bros., plumbing, glazing, and painting. The mosaic flooring is by Messrs. J. & H. Patterson, Manchester. The proscenium fibrous plaster work and decoration to same by Messrs. F. de Long & Co., London. The fireproof curtain by Messrs. Merryweather & Sons, London. The hydrants and fire-extinguishing appliances have been supplied by Messrs. Shand, Mason, & Co., London. The sun-burners and brasswork by Messrs. Guest & Chrimes, Rotherham. The ventilators by Messrs. Boyle & Sons, London. The sanitary fittings by Messrs. Danks & Co., Birmingham. The heating has been executed by Mr. W. Haslam, heating engineer, Harstoft. The architect is Mr. W. H. Wagstaff, Chesterfield, whose plans were selected in competition.

PROPOSED PUBLIC HALL, PITLOCHRY, PERTH. It is proposed to erect a public hall at Pitlochry, which is to be built upon a site near the Established Church. It is to be built of stone, and it will be of the Scottish Renaissance style. The front wing measures 55 ft. in length, and the hall proper abuts on it at an angle. In the frontage on the ground floor is a vestibule, with ladies' and gentlemen's dressing-rooms on each side, and with a staircase which leads to the floor above, whereon is situated a small hall capable of seating 110 persons. The main hall itself measures 60 ft. by 33 ft. 6 in., and is seated to accommodate 500 persons, while the gallery, entered from the first floor of the frontage, affords accommodation for 112 persons. The stage is 25 ft. long by 14 ft. broad, and on each side of it are rooms suitable for the storage of baggage, while to the rear are retiring rooms for ladies and gentlemen. The height of the ceiling is 24 ft. The total cost of the work is estimated at 2,266*l.* Mr. Ness, the successful designer, is assistant with Messrs. John Bruce & Sons, architects, Dundee, who will carry out the work.

THE MARGATE AND SOUTHEND KURSAALS, LIMITED.—It is proposed to form a new company (to absorb the Southend Tower and Marine Park Company) for completing the works that were begun last spring at Southend, and for carrying out a similar enterprise at Margate. The company's joint architects are Mr. George Sherrin and Mr. John Clarke. The latter has prepared plans and designs of a pavilion (capacity for 4,000), a restaurant, baths, promenades, &c., and nineteen shops, on a freehold site at Margate, which has been acquired for 45,000*l.*, at an estimated cost of 90,000*l.*, including furniture and equipment. The site has a sea frontage of about 600 ft., near the jetty, and the buildings will stand upon columns, thus providing a front promenade or spa with an entrance from Fort Hill. The buildings at Southend now being erected by Mr. Abram Kellett, of London and Willesden, from the plans and designs of Mr. Sherrin and Mr. R. J. Gifford Read, C.E., include an "Eiffel" tower, with a circus within its base, and an arcade of sixty shops, to cost, it is estimated, 80,000*l.* The site covers about 26 acres of garden ground, and the surplus land will be used for the erection of twenty-seven shops and fifty-three houses.

CHANCEL SCREEN, &C., ST. PETER'S CHURCH, NOTTINGHAM.—The Bishop of Southwell has just dedicated new chancel screen and choir stalls at St. Peter's Church, Nottingham. The stalls, which are of oak, are late in character. The fronts to the boys' book boards are pierced with panels of trefoil tracery, while the fronts of the men's bookboards

have quatre-foil panels; the backs of the men's seats are panels with trefoil heads with coved canopy over same, the carved cornice to the canopy being surmounted by a cresting. The ends of the stalls have traceried panels and all spandrels are carved. The new screen is late Decorated in character, and has four bays on each side of a gateway. The subbase is of polished Hopton wood stone, the remainder of the screen being of oak. The lower portion of the screen has solid panels with traceried heads on both sides. At the springings of the arch of the gateway and on the apex are angels holding shields bearing the symbols of Faith, Hope, and Charity. The figure at the apex of the arch on the east side does not bear a shield, but is in the attitude of prayer. The buttress of each post of the screen has a corbel with moulded capital, on which stands an angel playing an instrument; the head of each bay is filled with moulded foliated tracery, and all cusps have foliated terminations. The moulded ribs supporting the canopy rise from carved caps above the angels. The cornice of the canopy is filled with foliage. The cornice carries the open traceried front of the rood loft, and on the top rail of this front are carved capitals on which stand angels holding shields charged with symbols of the Passion. On the centre of the loft stands a cross with the figures of St. Mary and St. John on the side supports. A new brass lectern is given by Mr. Wm. Gibson, in memory of his brother, Jas. Baily Gibson, and others; this is the work of Messrs. Hardman, Powell, & Co., Birmingham. The new frontal, dossal, and side hangings at the east end are the gift of Mrs. Baily-Browne, and are the work of Messrs. Watts & Co., London. During the Jubilee year the organ was in part rebuilt and renovated under the direction of Messrs. Lloyd & Co., Nottingham. The chancel floor has recently been entirely renewed with Godwin's tiles and Italian mosaic. A new altar rail, in character, with the choir fittings, has been provided. All the steps to this and the chancel are of polished Hopton wood stone, prepared by Messrs. Killer Bros., of Middleton, Derbyshire. The chancel ceiling and walls have been recently coloured and the ceiling decorated by Messrs. Powell, of Lincoln. The works generally have been carried out by Mr. Woodsend; the carving to the screen has been done by Mr. Bridgman, of Lichfield; the carving to the stalls and altar rails being executed by Mr. Wm. Garrard, Nottingham. The architects are Messrs. Evans & Son and Mr. Wm. Jolley, a late member of the firm, who has taken an active interest in the matter.

Proposed Lunatic Asylum, Canterbury.—Lieut.-Colonel Albert C. Smith, R.E., an inspector of the Local Government Board, attended recently at the Guildhall to hold an inquiry into the application of the Canterbury Town Council to borrow 70,000*l.* for the purchase of the Stone House Estate and for the erection of a lunatic asylum. The architect is Mr. W. J. Jennings.

Monastery, Clonard, Ireland.—The foundation stone of the new Monastery of the Most Holy Redeemer was laid on the 15th inst., at Clonard, Falls-road, for the Fathers of the Redemptorist Order. The new building will consist of confraternity room, parlours, refectories, community room, bishop's room, and infirmary. There will be fifty-four bedrooms. It will be four stories in height, and executed in Belfast pressed brick, with stone dressing. Mr. J. J. M'Donnell, J.P., is the architect, and Messrs. W. J. Campbell & Son are the builders. Mr. Thomas O'Byrne is the Clerk of Works.

Rebuilding of Hengler's Circus, Hull.—A new circus is now being erected on the site of Hengler's late circus, on the Anlaby-road. The exterior has been extended at each side, taking in the old stabling and property entrance, and thus widening the building some 20 ft. or more. The architect is Mr. Percy Runton, Hull.

Proposed Church House, Liverpool.—The committee of the proposed Victoria Church-house, at the corner of Lord-street and South John-street, Liverpool, have, it is stated, just approved plans prepared by Mr. Bradbury, the Diocesan Surveyor, and building will shortly be started on the rear portion of the site in South John-street and near Cable-street.

Building at Hampstead.—The fields between John-street and Pond-street have been taken for building purposes, and are now being covered with houses. The ground abuts upon the gardens of Wentworth House and Lawn Bank, which were formerly known as Wentworth-place, in John-street. The gardens are bounded by a brick culvert that, according to two old maps, appears to have carried an affluent of the Fleet from Rosslyn-hill to the pond, now filled in, at the bottom of Pond-street. The culvert is being filled with concrete for the erection of a wall along its length. Keats lived at Lawn Bank, with Charles Brown, from 1817 until 1820, when he left for Italy; at that time the house was divided, the other part being occupied by Mrs. Brawne and her daughter. The Hampstead West Heath Land Company are developing their estate on the land adjacent to Platt's-lane, leading from the Finchley-road to Child's Hill-lane and the West Heath. Some houses are being built in Rosecroft-avenue from the plans and designs of Mr. C. H. B. Quennell, with, we understand, Mr. H. E. Tatlow as consulting architect.

Premises, St. Martin's-lane.—The new premises, at the corner of Great Newport-street, are being erected by Messrs. Courtney & Fairbairn, of Camberwell, from the plans and designs of Mr. R. A. Lewcock.

A New Theatre, Charing Cross-road.—Mr. Charles Wyndham is about to build for himself a new theatre on the site, now being cleared, of the block of buildings bounded on the west side by Charing Cross-road, and on the three other sides by St. Martin's-court. Mr. W. G. R. Sprague has prepared the plans and designs, and Mr. C. F. Kearley's tender for 20,400*l.* is, we are informed, accepted; portions of St. Martin's-court will at the same time be widened.

Exhibition, Middlesbrough.—An exhibition of arts and industries is being promoted at Middlesbrough. The buildings, which have been designed by Mr. Frank Baker, Borough Surveyor to the Middlesbrough Corporation, are now nearly complete. The exhibition buildings proper occupy that portion of Victoria-square nearest the Grange-road Schools, and comprise two arcades 205 ft. long, extending from Dunning-street to Albert-road, and 40 ft. wide, and between them a central arcade, also 205 ft. long, but 60 ft. wide. The main entrance will be by a covered corridor from opposite the Municipal buildings in Russel-street. There will also be an entrance from Albert-road. Two exit doors will give access into Grange-road, while two doors, one on each side of the stage, will lead from the central arcade into Dunning-street. Practically the whole of the main buildings will be occupied by the stands of the exhibitors. These will be ranged down each side of the two smaller arcades, leaving a main avenue down the centre, while in the large central arcade, besides a row of stalls down each side, there will also be a row in the middle. In the central arcade also will be, at the Dunning-street end, a stage, 40 ft. long by 16 ft. deep. In this central arcade will be a terra-cotta fountain, built by Mr. J. Crossley. Outside the main building will be erected a theatre capable of holding from 400 to 500 people.

SANITARY AND ENGINEERING NEWS.

Proposed New Road at North Shields.—On the 17th inst. Mr. Robert H. Bicknell, Local Government Board Inspector, held an inquiry at the Town-hall, North Shields, in reference to the application of the Corporation for sanction to borrow 3,000*l.* for the construction of the Northumberland Dockyard, and 300*l.* for the improvement of the Tiger Stairs. Mr. Smillie, Borough Surveyor, presented plans showing the suggested new road, and explained that a certain part of it was liable to fall away. At the close of the inquiry the Inspector and members of the Corporation visited the places referred to in the applications.

Sewerage Disposal, Barkby, Leicestershire.—On the 18th inst. Colonel W. R. Slacke, R.E., on behalf of the Local Government Board, held an inquiry at the National Schools, Barkby, in connexion with the application of the Barrow-on-Soar Rural District Council for sanction to borrow 3,100*l.* for purposes of sewerage and sewage disposal for the township of Barkby. There was no opposition to the scheme. Mr. W. H. Simpson, C.E., produced plans of the scheme, and gave details.

Sewerage Disposal, Ledbury.—The Ledbury Urban District Council having applied to the Local Government Board for sanction to borrow 3,200*l.* for purposes of sewerage and sewage disposal, Mr. Herbert H. Law, Local Government Board Inspector, held an inquiry, on the 18th inst., at the Barrett-Browning Institute. Mr. Berrington, Wolverhampton, the engineer, and Mr. J. Ellis, Surveyor to the Urban Council, were present at the inquiry. No opposition was raised to the scheme.

The East-end Water Supply.—The intermittent supply of water to the districts within the area of the East London Waterworks Company was begun last Monday. On Sunday the normal quantity of water was poured into the East-end, but the constant supply ceased as from six o'clock on Monday morning, although water was obtainable throughout the affected districts for some three hours afterwards. The East London Waterworks Company informed the Local Government Board that the volume of water remaining in store above gravitation level on Monday morning was 169,000,000 gallons, or about one-seventh of the store when the reservoirs are full. It was stated that the New River Company was supplying the East London Company with all the water it could spare, about 4,000,000 gallons daily. Special stress was laid on the fact that where hydrants were attached to arterial mains the latter would be kept constantly supplied. In the more populous parts of the East-end standpipes giving a constant supply of water have been erected at the street corners.

Maidstone Water Supply.—The Mayor of the Borough (Mr. J. Barker) stated on the 22nd inst. to a correspondent that he did not believe there was any cause for alarm in the town. Undoubtedly there was a scarcity of water, but there was no danger of anything like a water famine. It was only necessary that people should be economical. At the present time there were, he said, 3,000 persons outside the borough drinking water from one of the springs at Farleigh which were cut off during the typhoid epidemic last year on the recommendation of the Medical Officer of Health. Ewell spring was not one of those which were proved to be contaminated, and the Town Council were about to consider the advisability of asking the water company to restore the supply derived from it. He was satisfied that the water company could not increase their supply by taking additional water from the Mid Kent Company. At present the Maidstone Company could only get about 3,000 gallons per hour from their neighbours, or a total of 60,000 or 70,000 gallons per day, whereas they originally guaranteed 100,000 gallons per day. The manager of the Maidstone Waterworks (Mr. Ware) states that the Ewell spring has been analysed fortnightly by Dr. Gregory, the company's analyst, during the past year, and it has maintained a uniform standard of purity.—*Times.*

STAINED GLASS AND DECORATION.

Memorial Window at St. Lawrence Church, Winchester.—The four-light window on the south side of the nave of this church has just been filled with stained glass in memory of the late rector, the Rev. Henry Manning Richards. The work has been carried out by Messrs. James Powell & Son, London. The tracery lights have been filled with the dates of the late rector's holding of the living, 1871 to 1894, and with coats of arms suggestive of his career. The four large lights below have figures of four bishops of Winchester, St. Swithin, William of Wykeham, Bishop Waynflete, and Bishop Andrewes.

St. Mark's Church, Wrexham.—New choir-stalls and priest's desk have been executed in oak by Messrs. Harry Hems & Sons, fron the designs of Mr. J. H. Swainson, architect, Wrexham. New lead-light glazing is also being inserted in the chancel, transept, and aisle windows, in place of the old glass, the leading of which was worn out. This has been done by Messrs. Williams Bros. & Co., Chester, also under the superintendence of Mr. Swainson.

Memorial Window, St. George's Church, Truro.—A memorial window, executed by Messrs. W. L. Moore, London, has been placed in the chancel of this church. The subjects of the two lights are King David and St. Gregory the Great.

FOREIGN.

France.—M. Stanislas Ferrand, Deputy of the Seine and editor of the journal *Du Bâtiment*, has opened a subscription to raise, in Paris, a monument to the memory of Charles Garnier.——A new sculpture gallery has been opened at the Louvre, in which are to be seen a series of original models in plaster and studies in terra-cotta by Carpeaux, as well as a bust by Houdon, and a figure of Christ carved in wood and dating from the twelfth century.——The "Palais des Beaux Arts" built on the Champ de Mars for the 1889 exhibition has been purchased by a timber merchant, who intends to erect it on a site in the Place des Ternes as a warehouse and sale-room. *Sic transit!*——The new Salle des Deputés, which has been commenced from the plans and under the direction of M. Buquet, will be 850 square mètres in area and 18 mètres high to the roof. It will be lighted from a large dome with glazed panels, and at night by a great number of electric burners. Large and convenient galleries will be formed for the public and the Press.——The Government has formally accepted the legacy of the painter Gustave Moreau, and is transforming his house in Rue La Rochefoucault into a museum, which will shortly be open to the public.——The municipality of Paris have undertaken the work of strengthening and repairing the tower of the church of Saint Germain de Près, which is in a dangerous condition.——M. Barrias is at work on the model of a monument in honour of Victor Hugo, which is to be erected in the "rond-point" of the Avenue Victor Hugo. The figure of the poet is represented as in youth, at the age when he wrote "Hernani" and "Notre Dame de Paris," seated on a rock at the base of which are four allegorical figures representing the Epic, the Ode, the Drama, and Satire. ——The two bridges over the Seine leading to the Ile St. Denis are to be rebuilt, at an estimated cost of 1,200,000 francs.——On Sepember 4 a large establishment is to be opened at Longjumeau, containing both a hospital for invalids and a refuge for the aged of the Seine-et-Oise department.——M. Jelineau, architect, of Bordeaux, has been elected President of the Société des Architectes of the south-west of France.——There is talk of demolishing the fortifications of Rochelle.——M. Jules Doré, architect, of Paris, has obtained the first premium in the competition for the proposed new Hôtel de Ville for Sens.——The Municipal Council of Lyons have adopted a scheme for getting water supply for the town from the lake of Annecy.——The death is announced of two French architects, M. Dissey, of Villiers-sur-Marne, and M. Croissant, of Paris.

Calcutta.—Section 12 of the proposed Municipal Bill runs as follows:—(1) "The Local Government may, at any time, and from time to time, if it appears to it to be expedient so to do, appoint a proper person to be Deputy Chairman of the Corporation. (2) Any person so appointed must possess engineering and architectural qualifications, unless the Local Government in any case considers it inexpedient to require such qualifications or either of them."—*Indian Engineering.*

MISCELLANEOUS.

GLASGOW CORPORATION PIPE CONTRACTS.—At a meeting of the Water Committee of the Glasgow Corporation on the 15th inst. the revised offers of the different firms for 1,000 tons of cast-iron water-pipes were under consideration. It appears that there is still a slight difference in favour of America of 66*l.* between the two lowest offerers. Further consideration of the matter was deferred.

"THE UNIVERSAL DIRECTORY OF RAILWAY OFFICIALS, 1898."—This directory, compiled from official sources by Mr. S. Richardson Blundstone, is published by the Directory Publishing Company, Limited (Catherine-street, Strand). It gives the mileage of railways in England and Wales, Scotland, Ireland, Europe, Asia, Africa, Australasia, North America, Mexico, Central America and West Indies, and South America, as well as the names of engineers and other officials connected with the different lines. The work, which is well-arranged and edited, contains a mass of very useful information. The "personal index of railway officials" is an important section extending over 125 pages of the directory.

PLYMOUTH MASTER BUILDERS. — Plymouth, Stonehouse, Devonport, and neighbourhood Master Builders' Association held its twelfth annual outing on the 18th inst. Leaving Millbay early in the morning, the party, numbering about thirty, went by saloon carriage to Bovey Tracey, and at the Dolphin Hotel a breakfast was partaken of. Char-a-bancs were in readiness, and after the meal a start was made for a drive through the heart of Dartmoor to Princetown and Burrator. During the greater part of the day, a storm of great violence raged, and the comfort of the excursionists was greatly interfered with. At the Barn, Dousland, dinner was prepared. Mr. Albert Lethbridge, the Chairman of the Association, presided; Mr. W. G. Lapthorn filled the vice-chair. A brief toast list included "Trade and commerce," proposed by Mr. A. R. Debnam, and responded to by Mr. S. A. Roach; "Success to the Association and the building trade," proposed by Mr. W. W. Blight, and acknowledged by Mr. W. G. Lapthorn; and "The visitors," submitted by Mr. C. H. Tozer. The health of the chairman was enthusiastically drunk, on the invitation of Mr. Debnam. The return journey to Plymouth was made by railway.

GLASGOW SCHOOL OF ART.—We have received the annual prospectus of the Glasgow School of Art, with particulars of the splendid array of classes for teaching every branch of art. The comparative table giving the proportion of medals awarded to pupils of various schools of art in the National competitions shows a remarkable preponderance in favour of the Glasgow school, which heads the list for the entire kingdom, and shows more than double the number of medals taken by all other schools and classes in Scotland.

WESTERN AUSTRALIA EXHIBITION.—It has been decided to hold an International Mining and Industrial Exhibition in Coolgardie in March, 1899. The Government of Western Australia have been pleased to recognise the undertaking, and have substantially supported it by granting to the Commissioners fifteen acres of land in a central position in addition to a liberal sum of money.—*Indian Engineering.*

OLD CLOCK AT HAMPTON COURT. — Messrs. Gaydon & Sons, of Kingston, have set in order the clock which for many years has stood, unwound, in King William III.'s state-bedroom—of which apartment the decoration was especially designed by Wren, as the original estimate, in his own handwriting, testifies—the carvings and the painted ceiling being by Gibbons and Verrio, respectively. The clock was constructed by Daniel Quare, and is fitted in a high oak case, with ormolu mountings. The two dials serve as a calendar throughout the year, and mark the hours of sunrise and sunset. The clock goes for twelve months without being rewound, and its mechanism was found to be in good condition. In the same room are two old barometers—one of them by Tompion, who died in 1713.

NEW LINING BRICK FOR SWIMMING BATHS.—The Farnley Iron Co. send us a description, with diagram, of a brick which they have patented with the view of rendering a swimming bath watertight without the aid of an asphalte lining between the facing bricks and the main wall. The bricks are made with a glazed face as usual, but the sides and ends are grooved and notched in a special manner. After the bottom and walls of the bath have been formed in the usual manner, in concrete or other material, they are roughly rendered and floated with cement about ¾ in. to 1 in. thick, and the surfaces trowelled; the walls and bottom are then lined with the grooved and notched bricks. When the bricks are thus built together on the walls and floor, and are properly secured in place by cement (gauged), the cement fills up the recesses between the bricks and keys them together, and locks them tightly to the supporting wall or floor with the aid of the dovetailed notches. Special shapes of the bricks are made for angle positions and for the lower courses where the bottom of the bath (as usual) is sloped. The bricks seem calculated to make a very solid and workmanlike construction; we do not suppose (nor is it apparently claimed) that there can be any economy in their use, as the greater cost both in the brick and in the labour of fitting and setting, must fully balance the saving from not using asphalte, but they will perhaps make a more solid and permanent work when fixed.

REREDOS, ALTON, HANTS.—The dedication of the new reredos at the Parish Church of St. Lawrence by the Lord Bishop of Winchester took place recently. The improvements at the east end of the church also included a new altar-cloth and the paving of the sanctuary with mosaic. The new reredos is from a design by Sir Arthur Blomfield, the Diocesan Architect. It is of English oak. In the centre panel is a carved representation of the Resurrection; on the right is a statue of St. Lawrence, the patron saint of the church; on the left is a statue of St. Swithun, the patron saint of Winchester; and on either side are the four Evangelists. The whole is surmounted by cresting and pinnacles.

CAPITAL AND LABOUR.

BRISTOL BUILDING TRADES.—At a meeting of the Bristol Building Industries Federation, held on the 16th inst., a report was received from a deputation which had waited on the master builders respecting the late dispute in the building trades. The report was to the effect that the employers had decided the halfpenny per hour advance to the whole of their employés should begin from the last pay day instead of from September 1, as per the arbitrator's award. This report was received with satisfaction, and the secretary (Mr. W. A. Pitt) was instructed to forward a letter to the secretary of the Master Builders' Association acknowledging this act of courtesy on their part and expressing the high appreciation felt by the members of the Federation at the manner in which the whole question in dispute had been settled.

PLUMBERS' STRIKE, DURHAM.—The plumbers of Durham city are on strike. The demand is for an advance of a penny per hour, so as to bring their wages up to the level of other towns.

LEGAL.

EMPLOYERS' LIABILITY CASE.

IN the City of London Court, on the 18th inst., before Mr. Commissioner Kerr and a jury, the case of Mabey *v.* Colls came on for hearing. It was an action brought under the Employers' Liability Act by Thomas Mabey, a carpenter and joiner, against his former employers, Messrs. Colls & Sons, builders, of Coleman-street, E.C., to recover 350*l.* damages for personal injuries sustained in consequence of the defendants' alleged negligence. It appeared that the plaintiff was one of a number of workmen employed by the defendants, on March 8 last, to effect certain alterations at a house known as 10, Brook-street, Grosvenor-square. His case was that, while he was cutting away a joist in a room on the ground floor in accordance with instructions received from the acting foreman, a plank of wood fell upon him from a scaffold above and caused injuries which, according to the medical evidence, were likely to be of a permanent character, and to prevent him following his occupation in the future. The negligence complained of was that the scaffolding was improperly constructed, and expert evidence was called to show that it was impossible for a board to fall, as this one had done, from a properly constructed scaffold. The defendants denied all knowledge of the accident, and said that the only scaffold of the height described by the plaintiff was in the hall, and that was properly constructed and close boarded. The jury, however, found for the plaintiff, and awarded him 50*l.* damages. Judgment was entered accordingly with costs.—*Times.*

SETTLEMENT OF A BUILDING DISPUTE.

THE case of Stapp *v.* The Aërated Bread Company, Limited, was again before Mr. Justice Phillimore, sitting as Vacation Judge, on the 24th inst.

Upon the case being called on,

Mr. Alexander, Q.C., representing the plaintiff, said that his Lordship would remember that it was a case in which the plaintiff sought to restrain the defendants by injunction from carrying on certain building operations during the night. The defendants, however, through their counsel, had assented to an order which disposed of the whole action. By the order the defendants undertook to complete their building operations between the hours of 6 a.m. and 6 p.m., and to pay to the plaintiff £50 damages, such sum including costs. All further proceedings to be stayed except for the purpose of enforcing the order.

His Lordship made the order as asked.

ALLEGED INFRINGEMENT OF ANCIENT LIGHTS AT SURBITON.

ON the 24th inst. the case of Philpott *v.* the Surbiton and Long Ditton, &c., Society, Limited, came before Mr. Justice Phillimore sitting as Vacation Judge. It was a motion by the plaintiff to restrain the defendants from erecting buildings which interfered with his ancient lights. Counsel stated that there were negotiations pending between the parties with regard to a settlement, and asked that the motion might be allowed to stand over for a fortnight.

In answer to his lordship, the learned counsel stated that an interim injunction had been granted restraining the defendants raising one of their walls any higher.

His lordship granted the application.

SETTLEMENT OF A BUILDING TRESPASS CASE.

THE case of Knee *v.* Benson came before Mr. Justice Phillimore, sitting as vacation Judge, on the 24th inst., on a motion by the plaintiff to restrain the defendant from committing a trespass by breaking a hole in a wall and putting in certain lights. Counsel, upon the case being called, stated that the parties had come to terms, having agreed to an order by which the whole action was disposed of. (His Lordship assented to the terms which the parties had arrived at, but which were not stated in court.)

ANCIENT LIGHT DISPUTE.

The case of Webster *v.* Raphael Tuck & Sons, Limited, was in the list for hearing before Mr. Justice Phillimore on the 24th inst. On the case being called, Mr. Mulligan, Q.C., for the plaintiff, said that the case came before his Lordship in the form of a motion to restrain the interference with ancient lights. As, however, the parties were in negotiation, it was hoped that a settlement would be come to, and it was asked that the case might stand over till the 1st ult. in order that an arrangement might be made.

His Lordship assented to the application.

ALLEGED INTERFERENCE WITH ANCIENT LIGHTS AT BRIGHTON.

THE case of Smith *v.* Costerton came before Mr. Justice Phillimore, sitting as Vacation Judge on the 24th inst., on a motion by the plaintiff, Mr. Thos. Smith, the owner of No. 13, Gloucester-place, Brighton, to restrain the defendant, Mr. H. A. Costerton, the owner of the next house, No. 14, from building in the rear of his premises so as to interfere with the plaintiff's ancient lights. The defence was that, owing to the position of the two houses and the nature of the proposed building, the plaintiff would suffer no diminution of light, and that there was no sufficient material to warrant his lordship in granting the injunction.

His lordship said that on the evidence his opinion was that the plaintiff's light would be interfered with by the defendant's building, but allowed the case to stand over for a week in order that the parties might try to come to terms, the defendant not to raise his building on No. 14, Gloucester-place in the meantime.

W. & R. LEGGOTT, LIMITED *v.* GIBBONS.

THIS case came before Mr. Justice North on the 5th inst., on a motion by the plaintiffs, W. & R. Leggott, Limited, general brass founders and makers of window and fanlight openers, &c., Bradford and London, for an injunction to restrain Mr. James Gibbons, the defendant, of London and Wolverhampton, from passing off, or enabling or assisting others to pass off, his openers for skylights or fanlights for those of the plaintiffs, and from selling or offering for sale openers for skylights or fanlights or any goods under the description of "Leggott's Openers" or the "Silens Opener," or under any name or description of which the words "Leggott's" or "Silens," or either of such words, or any colourable variation thereof, form part other than and except openers or goods manufactured by the plaintiffs.

Mr. Swinfen Eady, Q.C., and Mr. E. Clayton appeared for the plaintiffs, and Mr. Swinfen Eady stated that terms had been agreed between the parties whereby the motion was to be treated as the trial of the action, and whereby an order was consented to restraining the defendant in the terms of the notice of motion, and for agreed damages and costs.

Mr. Justice North made the order accordingly in the terms agreed.

RECENT PATENTS:

ABSTRACTS OF ACCEPTED SPECIFICATIONS.

***Open to opposition until** October 3.*

[1897] 18,948.—BOLTS AND LOCKS: *J. Thomas.*—To the centre of the door-plate is pivoted a handle or lever that passes along the lock rail and is secured in position by a reversible clip pivoted to the handle or lever in combination with a staple on the door and a padlock; to the handle's pivoted end are pivoted, on either side, two bars or bolts, passing upwardly and downwardly through the guides and thence into the hasps when the lever is horizontal or locked; for operation, when the handle or lever is raised out of the horizontal position the upper bolt is drawn down and the lower one is drawn up out of the hasps, whilst a return of the lever bolts the door again.

19,668.—ASH PANS: *J. Harris.*—The ash-pan front has a semi-circular mould or strip along its top side, from

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
Municipal Buildings, Fire Station, &c.	Reigate Corp.	Not stated	Oct. 6

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Tools, Wheels, Axles, &c.	Burma Ry. Co.	Sec. 76, Gresham House, Old Broad-st. E.C.	Aug. 30
Church, Lecture Hall, &c. Malone road, Belfast	Committee	W. H. Stephens, Surv. Donegall-sq. North, Belfast	do.
Steam Laundry, Elgin, N.B.	Morayshire Steam Laundry, Ltd.	C. C. Doig, Archt. Elgin	do.
Hospital, Saunderton	Wycombe R.D.C.	E. Birks, Surv. Council Offices	do.
*Sewers	Barnet U.D.C.	W. H. Mansbridge, 40, High-street, Barnet	do.
Cast Iron Pipes, &c	Belfast Corp.	S. Black, Town Hall	Aug. 31
Covered Way at Infirmary	Birmingham Union	W. H. Ward, Archt. Paradise-st Birmingham	do.
Wrought Iron Railings and Gates	Wallasey (Cheshire) U.D.C.	W. H Travers, Engr. Public Offices, Egremont	do.
Additions, &c. Sandown & Hollington Schools	Hastings U.D. Sch. Bd.	A. Wells, Archt. Queen's-chambers, Hastings	do.
Road Works, Grove-road	Ilkley U.D.C.	F. Hall, Council's Offices	do.
Setts (500 tons)	Rochdale Corp.	J. Leach, Town Hall	do.
Sewerage Works	King's Lynn Corp.	E J. Silcock, Engr. 10, Park-row, Leeds	do.
Flagging, Paving, &c. Several passages	Birkenhead Corp.	C. Brownridge, C.E. Town Hall	do.
Pit Flints (1,000 tons)	Littlehampton U.D.C.	A. Shelley, Town Offices	do.
Street Works, Blackley-street, &c.	Middleton Corp.	Mr. Welburn, Boro Surv. Town Hall	do.
Additions to Schools, Tylorstown	Ystradyfodwg Sch. Bd.	J. Rees, Archt. Pontre	Sept. 1
Three Blocks Almshouses, Bell-street, Reigate	Governors	W. H. Prescott, C.E. Market Hall, Redhill	do.
County Private Retreat, Scaleber Park, Burley	West Riding Asylums Committee	J. V. Edwards, County Surv. Wakefield	do.
Surface Water Drainage	Cirencester U.D.C.	T. Hibbert, Surv. Council's Offices	do.
Additions to School, Llechyfedach, Wales	Llannon Sch. Bd.	W. Griffiths, Archt. Llanelly	do.
Cottage, &c. at Town Yard	Romford U.D.C.	Surveyor, Council Offices	do.
Public Hall, &c. Wells, Somerset		J. Johnson, Archt, 9, Queen Victoria-st. E.C.	Sept. 3
Making-up Mousehold-street and Others	Norwich Corp.	A. E Collins, C.E. Guildhall, Norwich	do.
Electric Light ng Works	Buxton U.D.C.	J. Taylor, Town Hall	Sept. 5
Culvert, Deadlake, near Devonport		J. F. Burns, Surv. Municipal Offices, Devonport	do.
Levelling & Paving New-street, &c. West Auckland	Bishop Auckland R.D.C.	C. Johnston, Surv. 1, Cradock-st. Bishop Auckland	do.
Covered Reservoir, Littleover	Derby Corp.	T. & C. Hawksley, C.E 30, Great George-st. S W.	do.
Car Shed, &c. Tinsley	Sheffield Corp.	C. F. Wike, C.E. Town Hall	do.
Schools, Hannah-st. Cadoxton, Glam.	Barry Sch. Bd.	Jones & Co. Archt. 18, St. Mary-st. Cardiff	do.
Schools, Ludlow-road, Woolston, Hants.		W. H. Mitchell, Son, & Gutteridge, Archt. Southampton	do.
*Sewerage Works	Malling R.D.C.	Prof. H. Robinson, 13, Victoria-st. S.W.	Sept 6
*Making-up & Paving Road	Fulham Vestry	C. Botterill, Town Hall, Walham Green	Sept. 7
*Electric Lighting Works	King's Lynn Corp.	Prof. H. Robinson, 13, Victoria-st. S.W.	do.
Public Baths, Portobello	Edinburgh Corp.	Surveyor, Public Works Office, City Chambers	do.
Tools and Stores	East Indian Ry. Co.	A. P. Dunstan, Secretary, Nicholas-lane, E.C.	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Drainage Works	Newcastle-on-Tyne Union	W. H. Dunn, Archt. 6, St. Nicholas-buildings, Newcastle-on-Tyne	Sept. 9
Electric Lighting Works	Bangor (N. Wales) Corp.	F. H. Medhurst, Engr. 13, Victoria-street, S.W.	Sept. 10
*Office Buildings	Ramsgate Corp.	W. A. McI. Valon, Town Hall	do.
*Electric Light Station Buildings	Bury St. Edmund's Corp.	J. Campbell Smith, Boro. Surv.	do.
*Twelve Cottages	Southgate U.D.C.	Surveyor, Council Offices	Sept 12
*School Buildings	Walthamstow S.B.	W. A. Longmore, 7, Great Alie-street, E.	Sept. 13
Aqueduct (17¼ miles) Cleobury Mortimer, Salop	Birmingham Corp.	J. Mansergh, Engr. 5, Victoria-street, Westminster, S.W.	do.
Two Steel Roofs, Hull Docks	N. E. Ry. Co.	T. M. Newell, Engr. Docks' Offices, Hull	Sept. 14
*Granite and Wood Paving	St Luke's (Middlesex) Vestry	Surveyor's Dept. Vestry Hall, City-road, E.	do.
*School Buildings	Central London School District	Newman & Jacques, 2, Fencourt, E.C.	Sept. 17
Schools, Manselton	Swansea U.D. Sch. Bd.	C. E. T. Lawrence, Archt. 181, Queen Victoria-street, E.C.	Sept. 19
*Schools	Enfield Sch. Bd.	do.	Sept. 20
*Additions, &c. at Workhouse	Westbury-on-Severn Union	W. F. Jones, 21, George-st. Gloucester	Oct. 3
Additions to Club Buildings, Ending Rochdale	Healey Conservative Club Com.	Butterworth & Duncan, Archt. South Parade, Rochdale	No date
Excavation Works, Savile-st. Sheffield	T. W. Ward	E. Winder, Jun. Archt. Wharf-street, Sheffield	do.
Additions to Holy Trinity Church, Shirebrook, near Mansfield		H. J. Price, Archt. 24, Low Pavement, Nottingham	do.
Sewerage Works, Summerville-road, Bradford		J. Smith & Sons, Archt. 14, Tanfield-chmbrs. Bradford	do.
Eight Houses, Valley-road, Spital		W. Glossop, 20, Cavendish-street, Chesterfield	do.
Eight Houses, Troedyrhiw, S. Wales	E. Stephens	C. M. Davies, Archt. 112 High-st. Merthyr Tydfil	do.
Sale Room, Hull	Lewendon & Son	Smith, Brodrick, & Lowther, Archt. 77, Lowgate, Hull	do.
Schools, Finch Hill, Isle of Man		T. W. Cubbon, Archt 54, Hamilton-st. Birkenhead	do.
Five Terrace Houses, Ilkley		F. S. Smith, Archt. Ilkley	do.
Boundary Walls, Rishton	Conservative Club	Sandbach & Parker, Archts 15, Richmond-ter. Blackburn	do.
Wesleyan Chapel, Etruria		R. Scrivener & Sons, Archt. Hanley	do.
Villa, Brecon-road, Abergavenny	Mrs. L. Hiley	E. A. Johnson, Archt. Abergavenny	do.
Additions to Laundry at Infirmary, Hereford		W. W. Robinson, Archt. King-street, Hereford	do.
Schools and Hall, Holy-road, Swindon	Managers	Silcock & Bray, Archt. Octagon-chmbrs. Milsom-street, Bath	do.
Sewerage Works, Chesterfield-road, &c.	Newbury Corp.	S. J. L. Vincent, C.E. Boro. Surv.	do.
Sewerage Works, Swanage		Francis Newman & Cocks, Engrs. 5, St. Thomas'-st. Ryde, I.W.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in.
*Buildings Inspector	Southend-on-Sea Corp.	125*l.* per annum	Sept. 2
*Superintendent of Cleansing	St. Marylebone Vestry	180*l.* rising to 230*l.* per an.	Sept. 5
*Superintendent Road Works, &c.	do.	150*l.* rising 200*l.* per annum	do.
*Superintendent of Sewers and Drains	do.	do.	do.
*Joiner	Charterhouse School (Godalming)	2*l.* 5*s.* per week	No date

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p.* — *Contracts, pp.* iv. vi. *&* viii. *Public Appointments, pp.* xvi. xvii. *&* xix.

which projects a flange or web to form an edging to the front; the moulding presents a convex surface standing up from the face of the front, and its web or flange may be either plain or ornamented.

20,421.—Testing and Tracing Leakages in Gas and other Pipes: *G. J. G. Jensen.*—The pipes are charged with air, or with gases and fumes generated by the appliance, by means of a force-pump, a generating chamber is attached, together with an indicator or gauge, fitted with a coupling and stop-cock.

20,558.—Water-closets: *T. C. Rhodes & R. Gaunt.*—For double-syphon closets having two water-seals, divided by an air-chamber, the inventors devise an air-pipe connected to the air-chamber, and passing up through the supply-pipe, the air-pipe's upper part has an inverted bend, or hood, which tends to draw air from the pipe when water passes down the supply-pipe. The basin may have a bend situated close up to it so that the air-chamber's upper portion is immediately below the end of the air-pipe. To minimise noise at the end of the flush, the bottom partition of the closet is made in a ∧ or rounded form to allow the gradual admission of air.

21,114.—Generation of Acetylene and other Gases: *H. R. Bean & H. Ringwood.*—As an improvement upon their Patent 5,756, 1897, and for recharging the apparatus whilst it is at work, the inventors form in the head of the rising vessel or gas holder two or more chambers, each with its proper cover, fittings, and charging cock, so that when one charge of carbide or gas-forming material is exhausted, the chamber may be recharged, the others coming in turn into operation.

22,329.—Valves and Cocks: *A. J. Riley & H. Hartley.*—The lower or valve seat has an open top cylindrical part projecting above it; in the centre of the solid disc part is formed a hole, closed at its lower end, and having its upper end shaped to receive the valve; from the inlet side of the body is drilled a hole to meet the central aperture, whilst from the opposite or outlet side is formed a right-angled passage to the interior of the cylindrical part. When the valve is placed in position the top of the cylinder is closed by a disc of thin flexible metal, soldered or otherwise sealed upon the end of the cylinder and around the projecting stem of the valve.

22,114.—Flexible Metallic Tubes and Joints: *Felten & Guilleaume.*—The tubes are composed of one or several layers of a soft, ductile metal, and of one or several layers of wire arranged so as to form a tube; the joint-piece consists of a circular case divided length-wise and with flanges, the packing being inserted between the latter, which are then drawn together by bolts or screws; the bore or interior of the shell which encloses the compound tube is enlarged or flared at one end; the exterior has an outwardly-projecting flange.

23,858.—Fastening Handles for Doors, &c: *A. Kellett.*—The handle has a spring catch that engages in notches on a rack formed upon the spindle or bar, the notches being so shaped as to enable one to fix the handle on to the spindle and secure it by means of the spring catch; a pin or pawl, attached to the clip or spring, passes through a hole in the neck of the knob and engages in the ratchet teeth; one side of the pawl is squared to form a back-stop.

[1898] 3,464.—A Ventilator: *R. Briggs.*—This is made in the form of a truncated cone, inverted, and open at both ends, which is fixed in a hole made in the roof or ceiling with its larger end projecting above; over the upper end is fixed a cap or cover of larger diameter, consisting of a disc, the position and dimensions of the cap being such that there are a space for escape of air between it and the cone, and a space all round between the flange and the cap's rim.

6,518.—Fire Escapes: *C. E. Cooper.*—Beneath the window-ledge within the room is fixed a bracket through which passes a spindle at each end whereof is bolted an S-shaped arm, whose lower end forms an eye for the bearings of a second spindle to which is attached a flexible ladder—rolled up when not in use; when needed, the arms are raised upon their hinge to rest upon the window-frame, and a rod at the ladder's lower end falls out of its supports, runs over the sill and unrolls the ladder.

7,539.—Keyless Tube Crane or Kitchen Sink Cock: *J. H. McDonald (of McDonald & Wilson).*—The inventor forms the cock, which may be of the screw-down type, with a stuffing-box at its side; the tube of the cock is connected to a short horizontal tube fitted with a flange adapted to be placed in the stuffing-box, thus forming a tight joint. The invention may be applied to "Lambert" cocks.

7,730.—Locking Safety-Chain for Doors: *O. Temke.* One end of the chain has a locking-piece than can be fastened into a lock on the door-jamb by simple insertion thereof, even when there is no one in the house, whilst the door can be opened from without by a key on pushing it open to the extent of the chain.

9,737.—Taking Flexible Moulds from Plastic Clay Models and Designs in Relief: *C. H. Rott.*—The method consists of covering the surface of the clay model with a medium of collodion or varnish composed of gum or wax dissolved in spirits of wine or other similar fluid absorbed by the clay or quickly set by evaporation, leaving a thin film, impervious to moisture. For varnish may be employed gum shellac dissolved in methylated spirits or ether. When set, by slightly oiling the model's surface, one may take a flexible mould in gelatine glue or compounds of gelatine, glue, and treacle, or glycerine.

13,574.—Guards for Circular Saws: *S. Lebus.*—The claim is for a hood consisting of two side-plates, with a cover over part only of their top, so that at the entering side the workman can see the saw, combined with a sliding plate and grooved head, a slotted sliding plate, with bolt and nut. The hood can be adjusted in height, or can be removed, and may also be adjusted centrally over the saw,

14,047.—Manufacture of Bricks, Clay Blocks, Tiles, &c.: *R. Bradshaw.*—The novelty lies in using for pug mills (*a*), two cylinders set in alignment, in each mill, one having a diameter less than the other's; (*b*) a shaft mounted between the cylinders in thrust bearings, the ends of the shaft having blades to work the clay in the larger cylinder and the smaller cylinder respectively, whereby if plastic clay be worked in the larger, and dry or stiff clay in the smaller cylinder, the forces exerted in opposite directions counterbalance one another; (*c*) perforated discs placed transversely to the stream of clay, and and arranged so as to subdivide the stream, in combination with means for again amalgamating the clay before delivery through the dies.

New Applications.

August 8—13.

17,028, G. W. W. Amick, Machines for Making Flexible Ladders. 17,030, Weidinger & Kiesewetter, Controlling Water Outflow from Taps or Pipes. 17,031, H. O. Strong, Gas-stove Atmospherical Burners. 17,049, Rawsons, Door Latch. 17,055, R. B. Jentzsch, Safety Locks. 17,057, J. Rosenthal, Water Closets. 17,067-8, J. Williams, jun., & Healey, Padlocks, Hasps, and Sash Fasteners. 17,071, E. Offenbacher, Decorated Glass. 17,079, F. Gehlert, 17,127, Bailey & Clapham, 17,199, F. P. Berange, 17,449, T. Manger, 17,504, G. W. Emmerson, and 17,518, T. G. Allen, jun., Acetylene Gas. 17,083, T. T. Kemp, 17,088, J. Schumacher, and 17,405, W. C. Jeapes, Acetylene Lamps and Generators. 17,090, W. M. Ducat, Distribution of Sewage, &c., on filter beds. 17,095, Bynoe & Cubison, Receiving and Delivering Gas. 17,113, Werner & Dietz, Automatical Electrical Alarms, &c. 17,123, Metcalfe & Morrison,

Ventilating, Humidifying, and Cleansing Rooms, Machinery, &c. 17,129, Rawlings, and 17,398, Woodhouse and Others, Flushing Cisterns. 17,134, B. F. Schwartz, a Plaster Board. 17,140-1, T. Pfister, Mosaics, Tiles, Bricks, Cloisonné Work, &c. 17,147, C. C. Worthington, Pumps. 17,153, W. H. Bysouth, Stair-treads and Coverings of Subways, Landings, &c. 17,158, W. Courtenay, Artificial Stone. 17,161, F. C. McMillin, Automatical Switches and Cut-offs. 17,162, J. Lejeune, Electrical Accumulator. 17,166, P. Jablonowsky, Counting Device for Cranes, &c. 17,173-4, C. F. Hanington, Door Checks and Spring Hinges. 17,186, T. Terrell, Coating and Soldering Metals. 17,189, W. Nicholson, Sliding and Reversible or Swing Windows, and Pivots and Locking-pieces for the same. 17,202, Purvis & Harbinger, Measuring and Registering Tap. 17,205, Prengel & Dickmann, Alarm Devices. 17,206, B. G. Davies-Cooke, Glazed Bricks, Tiles, Blocks, &c. 17,212, F. Greensill, Gas Stoves and Gas-heating Apparatus. 17,225, Niblett & Sutherland, Electrical Plug Contacts. 17,239, W. E. Barnes, for Securing Skirtings, Dados, &c., in Position. 17,245, Bunn & Hook, Lifting Jacks. 17,255, Malletts, Windows. 17,267, J. W. Swan, Incandescent Electrical Lamps and other Electrical Apparatus wherein Glass Bulbs or Vessels are used. 17,268, O. Behrend, Secondary Batteries. 17,285, Miller & Simpson, Automatical Water-heaters. 17,305, C. Walter, Baths. 17,310, T. Pfister, Imitation Stained Glass. 17,311, W. Legge, Bolts or Fastenings for Doors, Windows, &c. 17,316, J. Challender, Silent Flushing Apparatus. 17,318, J. W. Ogden, Device for Holding Lathe Cutters and Similar Tools in Position. 17,345, G. O. Lentschat, Electrical Bells. 17,348, Johnsons, a non-Slipping Tile or Tread for Floors or Stairs, &c. 17,349, G. Geissler, Raising and Discharging Water. 17,351, Stevens and Barker, Friction Clutches. 17,360, G. W. Osborn, Wall-papers. 17,379, W. G. J. H. Lewton, Joist and Rafter Shoes. 17,383, F. J. Kellow, Bungalows and Similar Buildings. 17,387, E. W. T. Richmond, Gas-grillers and Grilling Devices of Gas-heated Culinary Apparatus. 17,394, J. T. Pearson, Street Orderly Bins. 17,410, W. Eckardt, Kilns. 17,413, G. Stoff, Production of Round, Oval, and other Shaped Bodies from Plastic Materials. 17,420, J. Gordon, Fire-dogs, Combined Fire-dogs and Fenders, and Combined Fire-dogs and Fender-curbs. 17,446, T. Hansell, Fence Rail Sockets. 17,448, E. R. Tiburtius, Gas-heated Soldering Iron. 17,458, A. A. Beadle, Primary Batteries. 17,459, G. P. Edwards (commonly known as George Phœnix) Raising Bricks, Tiles, &c., during Building Operations. 17,460, W. Wood, Cutting-off Tables for Bricks and other Blocks. 17,463, Stevensons, Decorative Surfaces. 17,480, G. Mitchell, Stoves and other Fire-places. 17,494, D. Plumb, Cutting Bricks, Tiles, Pipes, and other Articles of Earthenware. 17,497, G. X. Dime, Fire-proofing Composition. 17,521, W. Youlten, Top Suspension of Sliding Sashes.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 11.—By WILBY & BALDEN (at Scarborough).

Scarborough, Yorks.—Huntriss Row, "The Metropole Hotel," f. £18,000

By H. G. MARTIN (at Ely).

Southery, Norfolk.—Freehold Fen Farm, 176 a. 3r. 15p. 3,575

By SURRIDGE & SON (at Kelvedon).

Feering, Essex.—Prested Hall Farm, 294 a. 1 r. 26 p., f. 4,500
Feering Lodge and 22 a. 1r. 17 p., f. 1,100
Feering Hill House, 59 a. 0r. 34p., f. and c. .. 3,460
Four cottage tenements, f., r. 19*l.* 240
Enclosures of land, 64 a. 0r. 8 p., f. 2,065
Inworth, Essex.—Two cottages called "Bridge House," f., r. 14*l.* 320
Feering House and 1 a. 0r. 5 p., f. 900
Enclosures of land, 2 a. 2r. 22 p., f. 362
Kelvedon, Essex.—Six cottage tenements, f., r. 30*l.* 530
Two plots of land, f. 110
Tollesbury, Essex.—An arable field, 3 a. 2 r. 0 p., f. 100
Black Notley, Essex.—Enclosure of meadow land, 2 a. 0r. 13 p., f. 165

August 12.—By WHITTINDALE & WATSON (at Coventry).

Coventry, Warwick.—Stoke Green, a residence and stabling, u.t. 786 yrs., g.r. 4*s.*, r. 35*l.* 845
Bulkington, Warwick.—Freehold farm, cottages, and 114 a. 2 r. 35 p. 3,150
Leamington Spa.—6, 10, 18, and 20, Clapham-ter., f., r. 57*l.* 1,070

By THOMPSON & CO. (at Exeter).

Uffculme, Devon.—Bridge Meadow, 4 a. 3 r. 9 p., f. 515

August 13.—By NOCK & JOSELAND (Bridgnorth).

Chetton, Salop.—Freehold farms, 326 a. 1 r. 20 p. 4,400

By E. S. GILDERS (at Frinton).

Frinton-on-Sea, Essex.—The Esplanade, two plots of land, f. 385
Fourth-avenue, four plots of land, f. 750
Station-rd., twenty-three plots of land, f. 980
Old-rd., five plots of land, f. 535
Oxford-rd., two plots of land, f. 150

By FRANCIS PITTIS & SON (at Newport).

Arreton, &c., Isle of Wight.—The Bathingbourne Estate, 351 a. 2 r. 18 p., f. 11,700

By G. W. FINN & SONS (at Canterbury).

Dunkirk, Kent.—A residence, out-buildings, and 2 a. 3 r. 15 p., f. 725

August 15.—By ALFRED SAVILL & SON.

Little Wakering, Essex.—Two enclosures of land, 28 a. 1 r. 2 p., c. 370
Five copyhold cottages 370
West Tilbury, Essex.—Well House, and 1 a. 3 r. 17 p., f. 370
Hoford-lane, two cottages and enclosures, 24 a. 2 r. 32 p., f. 850
Part of High House Farm, 30 a. 3 r. 0 p., f. 675
Great Wakering, Essex.—"Oldbury and Jaques" and 74 a. 1 r. 2 p., f., r. 160*l.* 3,575
Enclosures of land, 45 a. 3 r. 23 p., f. 2,610
Barling, &c., Essex.—Burton's Farm, 63 a. 3 r. 13 p., f. 1,325
North Shoebury, Essex.—Six cottages and 4 a. 3r. 39 p., f. and c. 850
South Shoebury, Essex.—Three cottages and 2 a. 0r. 27 p., f. 750

By W. H. COLLIER (at Lowestoft).

Somerleyton, Suffolk.—Holly Gardens and 3½ a. f. £1,000

By CALTHROP & BRIGGS (at Barrow).

Barrow, Lincs.—Enclosures of land, 143 a. 3 r. 15 p., f. and c. 5,317
Goxhill, Lincs.—Farm buildings and 34 a. 3r. 27 p., f. 935
Barton, Lincs.—Enclosures of grass land, 13 a. 1 r. 27 p. 670

August 16.—By BEAN, BURNETT, & ELDRIDGE.

Mile End.—58A, Burdett-rd., u.t. 76 yrs., g.r. 10*l.*, r. 50*l.* 390
Harringay.—1, 3, and 5, Boreham-villas, u.t. 95 yrs., g.r. 21*l.*, e.r. 96*l.* 885

By WATERS & RAWLENCE (at Salisbury)

Sutton Veny, Wilts.—The Greenhill Estate, 357 a. 2 r. 1 p., f. 15,100

By STEPHENSON & ALEXANDER (at Caerphilly).

Caerphilly, Glamorgan.—1 and 2, Croft's-ter., u.t. 76 yrs., g.r. 4*l.* 8*s.* 6*d.* 290
Castle-st., two plots of land, f. 675
44, Castle-st., u.t. 67 yrs., g.r. 13*l.* 10*s.*, r. 48*l.* .. 600
48 and 50, Castle-st., u.t. 75 yrs., g.r. 12*l.*, r. 70*l.* 1,015
Underhill House and warehouse, u.t. 12 yrs., g.r. 4*l.* 4*s.* 200
F.g.r. of 3*l.* 3*s.*, reversion in 5 yrs. 900
The Upper Factory and The Tower Refreshment Rooms, f., r. 20*l.* 1,310
29 and 30, Cardiff-rd., f. 500
31 and 32, Cardiff-rd. and 1, Fagan's-st., u.t. 58 yrs., g.r. 1*l.* 9*s.* 3*d.* 400
19 to 24, Bartlett-st., u.t. 91 yrs., g.r. 6*l.* 8*s.*, r. 59*l.* 12*s.* 520
Cardiff-rd., Brynilid, u.t. 71 yrs., g.r. 3*l.* 11*s.* 8*d.*, r. 30*l.* 540
Pontygwindy-rd., two tenements and a plot of land, u.t. 92 yrs., g.r. 6*l.* 12*s.* 8*d.* 560
Castle-st., The Old Armoury, f. 380
1, Treharne Villas, u.t. 94 yrs., g.r. 1*l.* 8*s.* 6*d.*, r. 26*l.* 260
Castle House, f., r. 30*l.* 1,425

August 17.—By STEPHENSON & ALEXANDER (at Cardiff).

Cardiff, Glamorgan.—8, Bute-st., u.t. 39 yrs., g.r. 3*l.*, r. 150*l.* 2,600
14, Courtney-rd., u.t. 985 yrs., g.r. 3*l.* 125
56, Gt. Frederick-st., and 1 to 8, Canal-ter., u.t. 136 yrs., g.r. 20*l.* 2*s.* 6*d.* 1,465
6, Charles-st., u.t. 939 yrs., g.r. 4*l.* 4*s.* 1,550
47, 49, and 51, Wood-st., u.t. 59 yrs., g.r. 9*l.* 7*s.* 6*d.* 1,125
26, 27, and 28, Millicent-sq., u.t. 900 yrs, g.r. 4*l.* 10*s.* 1,325
30 and 33 to 38, Frederick-st., u.t. 136 yrs., g.r. 16*l.* 2*s.* 680
11, Broadway, u.t. 74 yrs., g.r. 1*l.* 18*s.* 350
170 and 172, Broadway, u.t. 79 yrs., g.r. 10*l.* 10*s.* 3*d.* 550
139 and 140, Wellington-st., u.t. 57 yrs., g.r. 3*l.* 2*s.* 6*d.* 100
38 and 40, Bridge-st., u.t. 999 yrs., g.r. 3*l.* 15*s.* 190
18 to 24 (even), Telford-st., u.t. 85 yrs., g.r. 14*l.* 2*s.* 610
4 and 5, Wellington-st., u.t. 938 yrs., g.r. 5*l.* .. 165
Newport-rd., Glamorgan Villa, u.t. 57 yrs., g.r. 6*l.* 10*s.*, r. 100*l.* 1,050
Caerphilly, Glamorgan.—Bronrhiw, u.t. 92 yrs., g.r. 55*l.* 3,000

August 18.—By THOMAS WRIGHT.

Penge.—38 to 46 (even), Oakfield-rd., f., r. 180*l.* .. 1,705

By JONES LANG & CO.

Surbiton.—Lovelace-rd., Woodville, u.t. 140 yrs., g.r. 25*l.* 1,650

***Contractions used in these lists.*—F.g.r.** for freehold ground-rent; **l.g.r.** for leasehold ground-rent; **i.g.r.** for improved ground-rent; **g.r.** for ground-rent; **r.** for rent; **f.** for freehold; **c.** for copyhold; **l.** for leasehold; **e.r.** for estimated rental; **u.t.** for unexpired term; **p.a.** for per annum; **yrs.** for years; **st.** for street; **rd.** for road; **sq.** for square; **pl.** for place; **ter.** for terrace; **cres.** for crescent; **yd.** for yard, &c.

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G.	ton	8/0/0 0/0/0
Teak, E.I.	load	9/5/0 14/5/0
Sequoia, U.S.ft.cu.		1/9/0 2/0/0
Ash, Canada, load		3/18/0 5/3/0
Birch, do.		3/7/6 5/0/0
Elm, do.		4/13/0 5/13/0
Fir, Dantsic, &c.		9/0/0 4/9/0
Oak, do.		1/18/0 2/18/0
Canada		3/13/0 4/18/0
Pine, Canada red		c/0/0 0/0/0
Do. yellow		4/3/0 6/3/0
Lath, Dantsic,fath		4/10/0 5/10/0
St. Petersburg		5/0/0 6/10/0
Wainscot, Riga, &c., log		4/10/0 6/0/0
Odessa, crown		4/10/0 6/0/0
Deals, Finland		
2nd & 1st std	100	9/0/0 9/10/0
Do. 4th & 3rd		9/0/0 9/10/0
Do. Riga		7/10/0 8/10/0
St. Petersburg, 1st yellow		11/0/0 13/10/0
Do. 2nd yellow,		10/0/0 11/10/0
Do. white		9/0/0 11/0/0
Swedish		9/10/0 16/0/0
White Sea		10/10/0 17/0/0
Canada, Pine 1st		18/0/0 24/10/0
Do. do. 2nd		13/0/0 15/15/0
Do. do. 3rd, &c.		6/0/0 9/10/0
Do. Spruce, 1st		8/10/0 10/10/0
Do. do. 3rd and 2nd		7/10/0 8/10/0
New Brunswick		7/0/0 8/0/0
Battens all kinds		5/0/0 16/0/0
Flooring boards, sq., 1 in. prep. 1st		9/6 16/0
Do. 2nd		8/0 13/0
Other qualities—		6/3 7/0
Cedar, Cuba, ft.		/4 /4½
Honduras, &c.		/3½ /4½
Mahogany, Cuba		/5½ /7
St. Domingo, cargo av.		/5 0/2/3
Mexican, do. do.		/3½ /4
Tobasco, do. do.		/4 /6½
Honduras, do.		/4 /6
Box, Turkey, ton		4/0/0 15/0/0
Rose, Rio		7/0/0 24/0/0
Bahia		6/0 0 12/0/0
Satin, St. Doming.		0/0/5 0/2/0

TIMBER (*continued*).

Satin, Porto Rico	0/0/6	0/1/6
Walnut, Italian	0/0/3	0/0/7

METALS.

Iron—Pig, in Scotland ..... ton	2/7/2½	0/0/0
Bar, Welsh, in London	5/15/0	5/17/6
Do. do. at works in Wales	5/10/0	5/12/6
Do. Staffordshire, in London	6/5/0	7/10/0
COPPER—British cake and ingot	55/5/0	55/15/0
Best selected	56/15/0	56/5/0
Sheets, strong	60/10/0	61/10/0
Chill bars	51/18/9	0/0/0
YELLOW M. L. lb.	5d.	5¼d.
LEAD—Pig		
Spanish ..... ton	13/0/0	0/0/0
English com. bands	13/5/0	0/0/0
Sheet, English 6 lbs. per sq. ft. and upwards	14/5/0	0/0/0
Pipe	14/15/0	0/0/0
ZINC—English sheet ..... ton	23/0/0	0/0/0
Vieille Montagne	23/10/0	0/0/0
Spelter	20/11/3	20/12/6
TIN—Straits	73/15/0	0/0/0
Australian	74/9/6	74/10/0
English Ingots	76/5/0	77/5/0
Banca	c/0/0	0/0/0
Billiton	/0/0	2/0/0

OILS.

Linseed ..... ton	17/2 6	0/0/0
Cocoanut, Cochin	27/15/0	c/0/0
Do. Ceylon	22/0/0	0/0/0
Palm, Lagos	21/15/0	0/0/0
Rapeseed, English pale	27/10/0	0/0/0
Do. Brown	26/0/0	0/0/0
Cottonseed ref.	14/5/0	15/5/0
Oleine	13/10/0	14/10/0
Lubricating U.S.	0/5/3	0/7/6
Do. Black	0/5/0	0/6/6
TAR — Stockholm barrel	1/5/0	0/0/0
Archangel	0/12/6	0/0/0
Turpentine	22/0/0	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated by the name and address of the sender; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under £100 unless in some exceptional cases and for special reasons.]

BASFORD (Notts).—For re-erecting Beaufit-lane Bridge over the River Erewash, for the Rural District Council. Mr. G. W. Hawley, surveyor, York Chambers, King-street, Nottingham:—

Joseph Tomlinson	£5-9 4 3	Allcock & Son, Eastwood*	£415 15 0
H. N. Barry	502 18 6		
Jno. Tomlinson	432 12 0		

* Accepted.

BOURNEMOUTH.—For alterations and additions (new kitchens and offices) to the Boscombe Hospital. Mr. G. A. Bligh Livesay, architect:—

S. Whitaker	£213	Miller & Sons (accepted)	£190

BOURNEMOUTH.—For the supply of electric light pillars, as follows, viz.:—A. Nine cast-iron ornamental lamp pillars. B. Ten cast-iron ornamental lamp pillars, with special flanges. C. Nineteen ornamental carriers for arc lamps:—

	A. each.	B. each.	C. each.
J. Allen, sen., & Son	£18 5	£18 5	£7 0
Geo. Smith & Co.	12 5	12 5	5 10
W. Macfarlane & Co.*	10 4	12 18	7 16

* Accepted.

BOURNEMOUTH.—Electric lighting of pier, pleasure grounds, and winter gardens (Contract No. 2, for the supply of steam dynamo, &c.):—

—	Type of Engine.	—
		£
Leonard S. Tate	Scott & Mountain	1,565 0
Brush Electrical Engineering Co., Ltd.	Universal (Brush Co)	1,367 10
R. Alger & Sons	Ransom, Simms, & Jeffries (compound)	1,425 0
	Do. (double cylinder)	1,337 0
United Ordnance and Engineering Co., Ltd.	Willans & Robinson	1,125 0
	(Own manufacture)	1,253 0
J. H. Holmes & Co.	Belliss & Co.	1,270 0
	Belliss & Co.	1,420 0
	Willans & Robinson	1,090 0
Electric Construction Co., Ltd.	Belliss & Co.	1,261 0
	Belliss & Co.	1,458 0
	Willans & Robinson	1,209 0
Crompton & Co., Ltd.	Belliss & Co.	1,219 0
	Belliss & Co.	1,376 0
	Willans & Robinson	1,675 0
Johnson & Phillips	Belliss & Co.	1,150 0
	Belliss & Co.	1,325 0
	Willans & Robinson (simple)	1,080 0
	Merrless & Watson (compound)	1,215 0
*Siemens Bros. & Co., Ltd.	Belliss & Co.	1,135 0
	Willans & Robinson	1,085 0

Cash, Robinson, & Co. (informal).
Mather & Platt (informal).
Warburg, Dymond, & Co. (informal).
* Accepted.

BRADFORD.—For the erection of eleven through houses, Newburn-road, Great Horton. Mr. Sam Spencer, architect, 244, Great Horton-road, Great Horton, Bradford:—

Masonry.—A. Emsley, Great Horton
Joinery.—E. Watmough, Great Horton
Slating.—J. Smithies, Great Horton
Plastering.—J. Black & Son, Bradford
Plumbing.—Thos. Perry
} Scheduled Prices.

BRIGHTON.—For additions, &c., to Royal Pavilion. Mr. F. J. C. May, C.E., Town Hall, Brighton:—

Satten & Evershed	£346	V. P. Freeman, Brighton*	£320
Thomas E. Nye	333		

* Accepted.

CLAYTON (Yorks.).—For alterations to laundry, &c., for the Guardians of North Bierley Union. Mr. Sam. Spencer, architect, 344, Great Horton-road, Great Horton, Bradford:—

Masonry.—J. Ward, Clayton
Joinery.—J. Briggs, Queensbury
Slating.—J. Smithies, Great Horton
Plastering.—F. Dean, Queensbury
Plumbing.—A. Walton, Clayton
} Scheduled Prices.

KNOCKDHU (Banffshire). — Accepted for the erection of bonded warehouse, for the Distillers' Company, Limited. Mr. W. Monro MacBey, C.E., Elgin:—

Building.—W. Cruickshank, Keith	£667 0
Carpentry.—G. & R. Cameron, Keith	941 0
Slating.—A. Strachan, Keith	345 0
Plumbing.—J. Wilson, Huntly	49 0
Painting.—A. Robertson, Huntly	24 15
Total,	£2,026 15s.

LEEDS.—Accepted for alterations, &c, to the "North Tavern," North-street. Mr. Fred. Mitchell, architect, Safe Deposit-chambers, Leeds:—

Masonry and Brickwork.—Chares Myers, Woodhouse-street
Joinery.—Banks & Mawson, 50, Water-lane
Plastering.—R. Brunton & Co., Lovell-road
Plumbing.—Jno. Stead, Alexander-street
Painting.—John Robinson, Kirkgate
Revolving Shutters.—W. F. S. Holt, Upper Croft Works, Bradford
[Rest of Leeds.]
} £1,252 18

LONDON.—For addition to 19 and 21, Wilson-street, E.C. Messrs. Tilsett & Yeoman, architects, 30, Finsbury-pavement, E.C.:—

Joselyne & Young	£1,070	Batt & Hart	£875
J. W. Heeps	912	Pearcey	696

LONDON.—For alteration of roof at Messrs. Adams Bros., 59, Moor-lane. Mr. E. Gwyder Jones, architect, 1, Albany-street, Regent's Park:—

J. W. Heeps	£231	Chessum & Sons	£197

LONDON.—For new staircase at Messrs. Clarke & Son, 168, Clerkenwell-road:—

Lascelles	£173 0	Hawtry	£121 19
J. W. Heeps	164 0	Little & Senegal	118 0

LONDON.—For rebuilding Nos. 23 and 24, St. Martin-street, S.W., for Mr. T. Dent Gardner. Messrs. Barnes-Williams, Ford, Griffin, architects, Railway-approach, London Bridge, S.E.:—

E. Lawrance & Sons	£2,574	f. W. Falkner & Sons	£1,853
H. Roffey	2,005	A. B. Chigwin	1,844

BOURNEMOUTH.—For the installation of electric lighting at the pier, pleasure grounds, and Winter Gardens, together with switchboards, cables, arc lamps, incandescent lamps, wiring, fittings, &c. (Contract No 1).—Mr. F. W. Lacey, Borough Engineer and Surveyor:—

—	Pier.	Pleasure Grounds.	Winter Gardens.	Switchboard, &c.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Leonard G. Tate	947 0 0	712 0 0	1,093 0 0	248 0 0	2,997 0 0
The Walsall Electrical Co, Ltd.	978 0 0	639 11 6	634 6 6	443 18 6	2,695 16 6
Siemens Bros. & Co., Ltd.	—	—	—	—	2,192 0 0
Crompton & Co., Ltd.	743 0 0	574 0 0	610 0 0	170 0 0	2,097 0 0
Johnson & Phillips	771 18 0	479 6 6	572 0 0	259 17 0	2,083 1 6
R. Alger & Sons	514 14 5	492 3 2	669 16 0	192 15 4	1,867 8 11
Cash Robinson & Co.	474 13 3	369 6 2	620 0 11	320 1 0	1,784 1 4
The Brush Electrical Engineering Co., Ltd.*	438 0 0	375 0 0	578 0 0	207 0 0	1,598 0 0

Warburg, Dymond & Co. (informal).
* Accepted.

LONDON.—For internal renovation of Bedford Chapel, N.W. Mr. Alfred Conder, architect, Palace-chambers, 9, Bridge-street, Westminster:—

McCormick & Sons	£225 0	Kerry & Hollidge	£179 9
Edmund Toms	225 0	A. J. Bellew (accepted)	159 10
J. Grover & Son	198 15		

LONDON.—For painting and repairs to infirmary, High-street, Lewisham, for the Lewisham Union Board of Guardians. Mr. Robert Williams, architect:—

Marsh & Co.	£4,749 0 0	Batchelor	£1,079 8 9
Leaf & Daughter	1,800 0 0	Penfold	1,059 5 7
General Builders, Ltd.	1,490 0 0	E. Mills	1,026 4 11
E. Jones	1,350 0 0	F. Harris	1,020 0 0
E. Proctor	1,236 0 0	Inns, Market-street, Watford, Herts*	984 0 0
T. J. Barden	1,149 11 9	W. Mills	904 10 8
W. Vanstone	1,130 0 0	W. Beazly	806 17 3
Foley	1,117 0 0		

* Accepted provisionally.

LONDON.—Accepted for erecting ladies' cloak-room and lavatory on the Recreation Ground, Carlam Grove House, for the Wood Green District Council. Mr. J. Gunyon, Engineer:—
Jas. Paney, Wood Green £220

MARKET DEEPING.—For additions to schools, for the Maxey School Board. Mr. J. G. Stallebrass, architect, North-street, Peterborough:—

Pine & Letall	£485	Aspittle & Neaverson, Werrington (accepted)	£398
Hipwell & Co.	400		

NEW MILLS.—For laying 1,200 lineal yards 18 in. pipe sewer of iron, steel, and fireclay, including 300 lineal yards of tunnel through the Torr; 500 lineal yards of 9 in. pipes or thereabouts, together with manholes, storm overflows, flushing tanks, river crossings, and other contingent works, for the Urban District Council. Messrs. Spinks & Beever, engineers, 9, Albert-square, Manchester:—

J. Alsocuth & Son	£5,195 3 0	Allen Taylor, Hazelgrove*	£4,262 3 0
G. M. Collins	4,784 15 8	Edward Cheetham	4,000 0 0
George Bell	4,615 6 11	J. Ford	3,984 5 1
Geo. Freeman & Sons	4,509 14 0		

* Accepted.

ROCHESTER.—For additions, &c., to Wainscott Schools, for the Frindsbury School Board. Mr. G. E. Bond, architect, High-street, Rochester:—

H. E. Phillips	£695	G. Gates	£575
C. Roberts	688	A. Ruby	540
G. West	576	H. Wyles, Chatham*	539

* Accepted.

STRANORLAR (Ireland).—For the erection of five labourers' cottages, for the Union Guardians. Mr. W. McElwee, architect, Foyle-street, Londonderry:—
McCaffrey, Lifford £650

THETFORD (Norfolk).—For the erection of a vestry, St. Cuthbert's Church. Mr. A. J. Lacey, architect, 6, Upper King-street, Norwich:—

J. W. Bunning & Son	£313 9	W. Curtis	£280 0
W. Boughton & Sons*	295 0	S. Holden, Thetford*	276 0

* Accepted.

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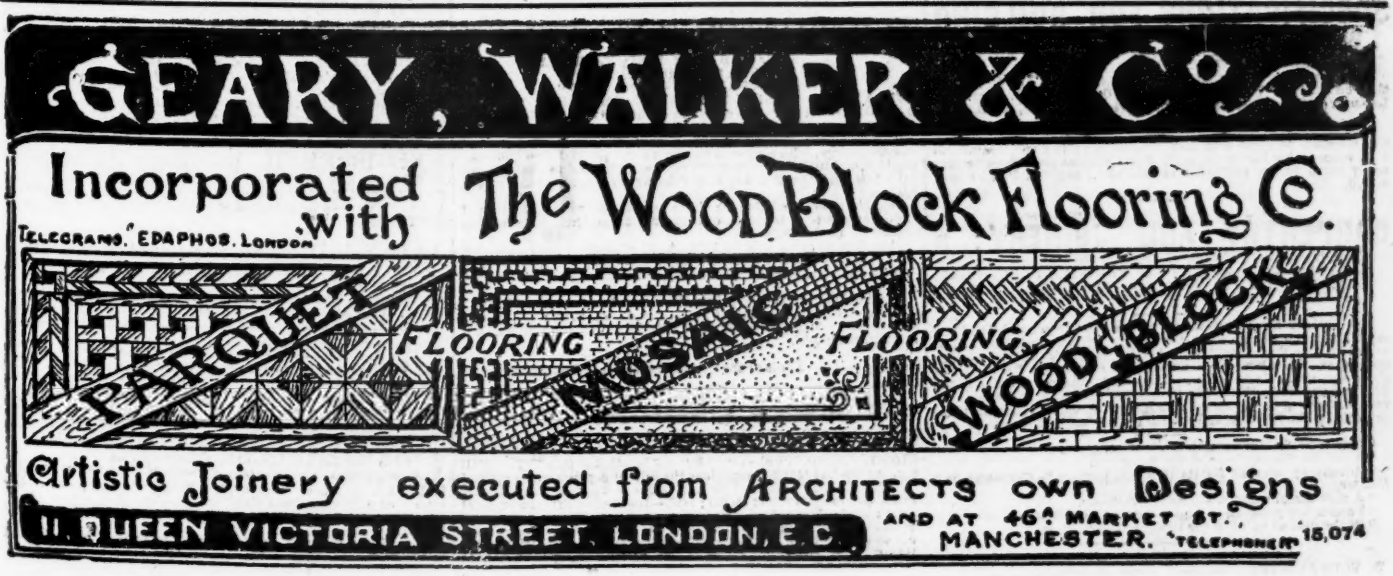
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21. Sherborne	APRIL.	23.* Pershore	OCT.
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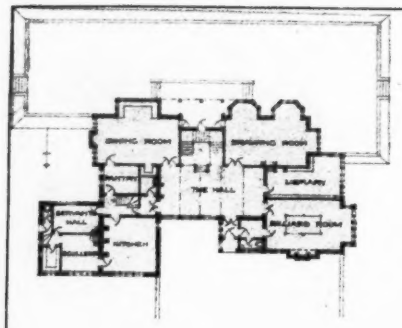

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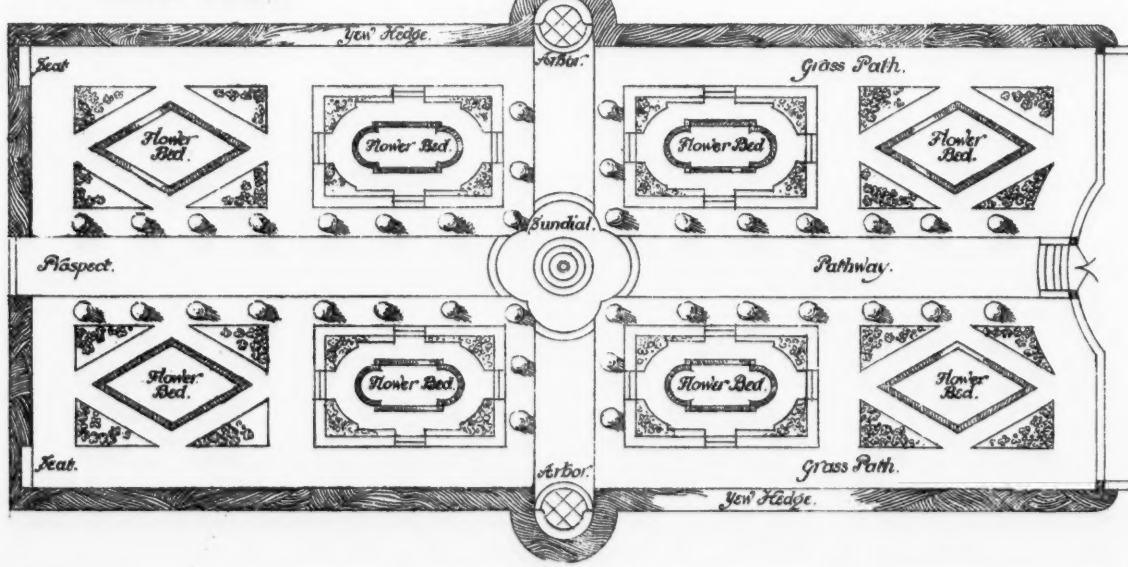

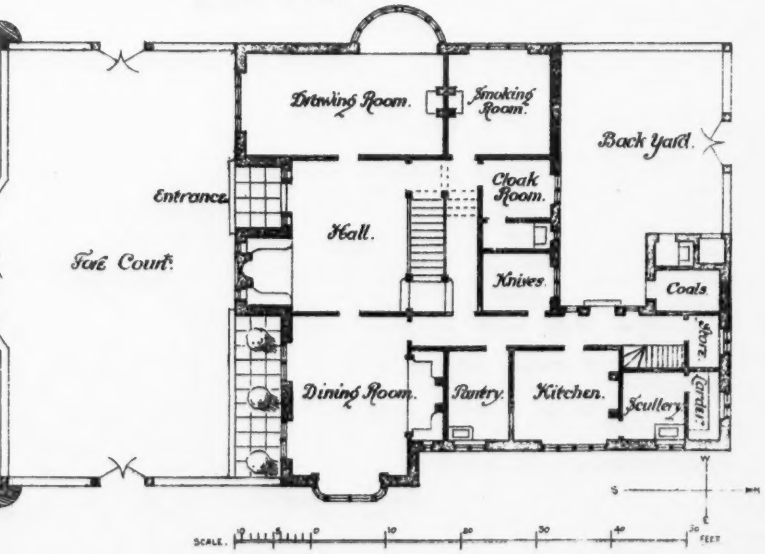

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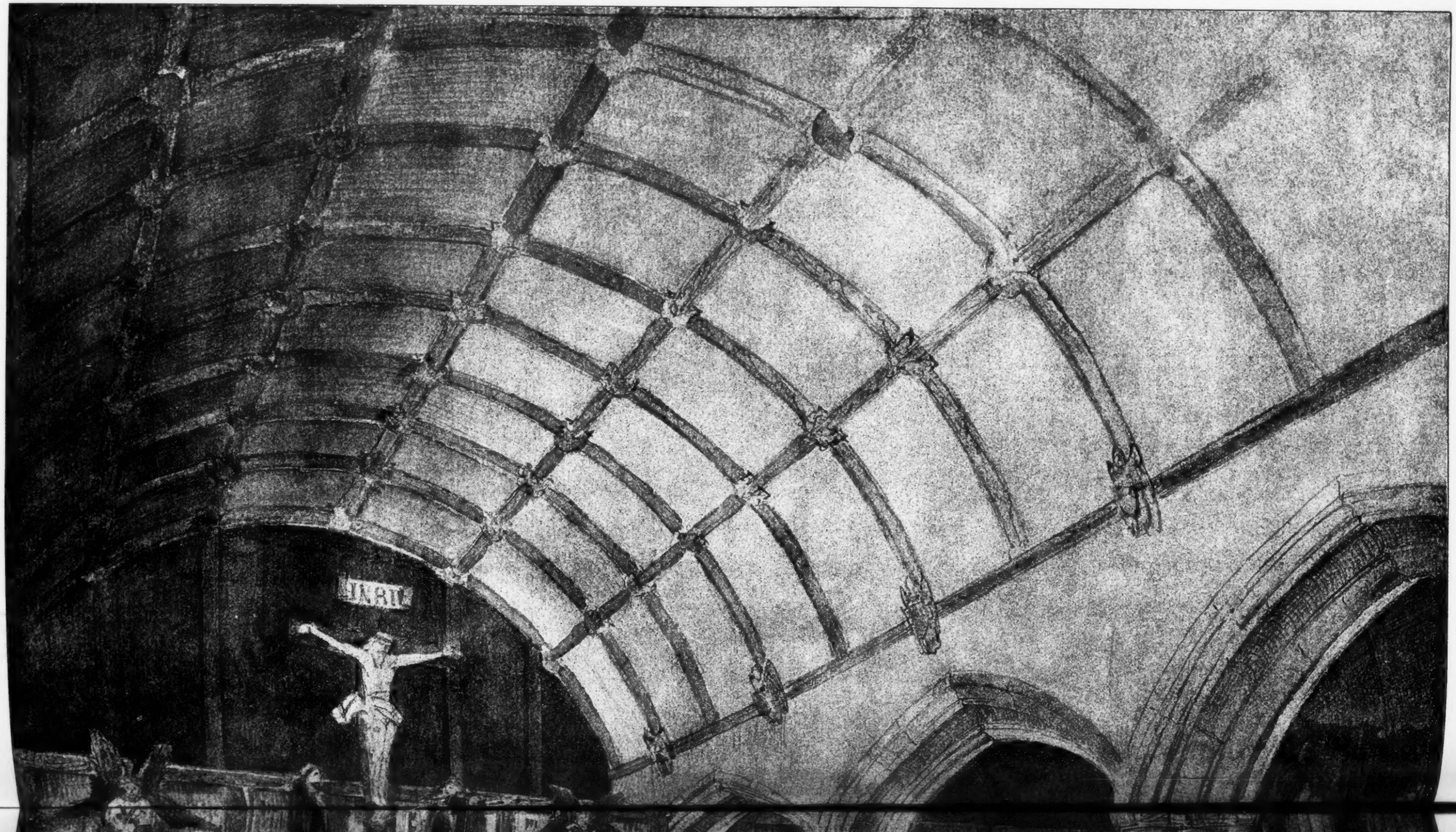
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